

PPALACHIA

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CHICAGO





Why spend the money for a vacation place when the Volkswagen Camper takes you any place?

You don't just move in a Volkswagen Camper — you move into it! The Camper gives you generous room to sleep two adults and two children. Comfortably! Plus a wardrobe, two tables for indoor and outdoor serving and a 23-gallon water tank. Even curtains, lights and the striped awning are supplied. The Volkswagen Camper costs but \$2,931.81*.

If you like, you can add the optional cupboard (with ice box), the portable chemical toilet and the 2-burner stove and take off for a weekend or for months.

Before you even begin to think about making vacation plans, come see — and drive — the Volkswagen Camper . . . at your authorized Volkswagen dealer in New England.



* suggested retail price, East Coast P.O.E.

Doubles as a day-to-day station wagon too.

**Test drive the Camper at
your Authorized VW Dealer**



ASA C. OSBORN CO.

16 Kingston St., Boston 11, Mass.

(Near corner of Summer St., 1 block from Jordan Marsh)



COMPLETE OUTFITTING FOR WILDERNESS, CAMP AND TRAIL

For the utmost in sleeping comfort, we present the following line of DOWN FILLED robes and bags. Water-fowl Down has far superior insulating qualities than any other known material. Hence, it is possible to eliminate much weight and bulk without sacrificing warmth.

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Outer material of high thread count, light, durable, water-repellent cotton. Carrying bag and web straps supplied with each robe or bag.



33" x 78"
Opened
13" x 8"
Rolled
3½ Lbs.
\$35.00

SKYLINE: A compact, practical robe, with a normal temperature range of down to 32 degrees. Shaped "Eskimo Style" to confine heat and eliminate extra weight and bulk. 36" slide fastener, and draw-string top.



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MOUNTAIN MASTER: Designed for 0 Degree temperature, especially for mountaineers and skiers. Adjustable feature allows personalized "fit" for the tall or short. Large opening with draw-string at top. Completely encloses person.



36" x 82"
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\$37.50

FEATHERLITE: Sleeping bag style. Designed for lightness and compactness, for a temperature range down to 36 degrees.

Mountaineering Equipment—Ropes, axes, pitons, carabiners, boots, clothing
Dacron sleeping bags \$19.95 to \$27.50. Lightweight equipment our specialty.
Brochure available.

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NO. 324.

C&T MOUNTAIN

TOP SLEEPING BAG.

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THE ALPS HANDMADE IMPORTED SPORT SHOES & BOOTS

for the OUTDOOR MAN
and WOMAN

From \$8.95 to \$22.95



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#107 For Men & Women. Excellent construction, Vibram lug sole gives tight grip and will not skid on steep grass or rock slopes. Ideal for mountain climbers and hikers. Dark Brown. Women—5 to 10 N.&M. Men—6 to 12 N.M.W.



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(#441—All Brown suede)

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PACKS

Pack Baskets—made of woven split oak—18" or 15" high. Imported Ruck Sacks with tubular steel spring frame.

COOKING EQUIPMENT

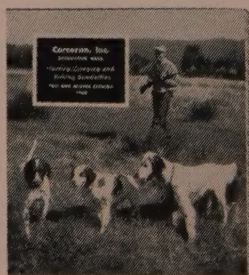
16 piece aluminum outfit—4 plates, 4 cups, 4 tumblers, teapot, skillet, kettle—all pack into kettle. Alcohol Stove—compact—weighs 2 lbs.—folded it is 5½" x 4" x 3". Cooking Kit—includes frying pan, kettle, pan, cup and carrying case—weighs 1 lb.

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Down filled, from 2½ lbs., mummy type to full size bags . . . virgin Dacron fibre filled bags, of highest quality materials . . . also, air mattresses and pillows, ground cloths, etc.

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MT. MCKINLEY SLEEPING BAG

Overlapping tube construction. 3-lbs. best grade down. 52" x 76". Adjustable draw string hood closing. Made of water-repellent Byrd Cloth with 38" zippered opening and closing seam, both fully weather sealed. Carrying case. Total weight, 5¼ lbs. Postpaid, \$49.50

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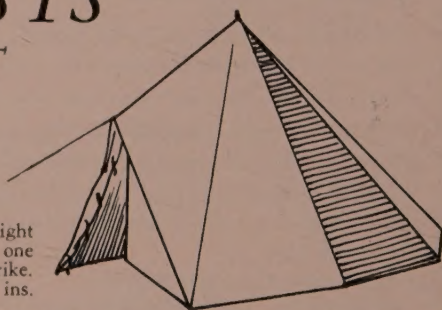
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BACKPACKING
CAMP KIT

The "ITISA" Mk. II

The perfect tent for the Lightweight Camper. Having only one pole and one guy line it is easy to erect and strike. Width 7 ft. 6 ins. Depth 6 ft. 9 ins. Height 5 ft. Weight 3 lb. 14 oz.



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Hand made mountaineering equipment
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Sporthaus Schuster



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WESTERN GERMANY

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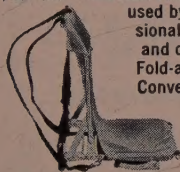


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Style No. 954

TRUE MOCCASIN

Brown oil treated leather camp moccasin; single rubber sole with spring heel under arch.



FOR COMFORT ON THE TRAIL . . .

There's No Substitute For

Bass

Outdoor Footwear

Over 84 years' experience in making comfortable, serviceable footwear for outdoor men and women is your assurance of complete satisfaction.

Style No. 1901

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Rugged Vibram rubber-cleated soles, lightweight for miles of climbing ease.



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G. H. BASS & CO., 276 Main Street, Wilton, Maine

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ONLY Grumman GUARANTEES QUALITY



Sterling Mark
of Quality

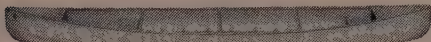
GRUMMAN Canoes are built to take it! Give maximum service with minimum maintenance—rugged design insures stability—lightweight means easy portage or cartop transportation. 12 GRUMMAN Canoe Models—13-ft. to 20-ft.—all easily equipped for rowing, sailing or cruising with outboard motor as well as paddling.



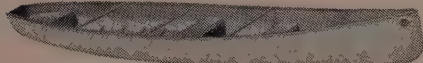
15 ft.—Fuller ends and flatter bottom give steadiness and capacity of larger models—easily handled by one person—for cartop and portage.



17 ft.—Finer lines make it fast—carries sail well—higher ends for rough waters—a built-in shoe keel can be ordered for running rapids.



20 ft.—**GUIDES MODEL**—larger capacity, portability—the choice of North Country Guides—standard weight, reinforced for heavy duty. Outboard motors may be used on Grumman side bracket.



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Aluminum Boats
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Used canoes bought,
sold or rented
by day or week.

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FREE! Send
for full-color
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Catalog and
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Division of Pearson Corp.

Subsidiary of GRUMMAN AIRCRAFT ENGINEERING CORP.

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Shop in the North Country

in the Jackson-Pinkham Notch
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A friendly, unhurried atmosphere where you can browse to your heart's content.

A distinctive selection of Town and Country wear—imported and domestic—and the unusual in accessories.

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Open year 'round

Ski Dept. Kept Open in Summer

Jack and Peggy Frost

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JACKSON, N. H.

Jack Frost SHOP

P.S.—When at Lake Winnepesaukee visit our shop on Route 109 in the center, Wolfeboro, N. H. Open late May to Labor Day



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Com. 6-6050

EVERYTHING FOR SKIING . . .

a complete line of Domestic & Imported skis, boots, bindings, poles, clothing, etc. . . .

Rental equipment and storage

**GOOD SELECTION IN CAMPING AND
MOUNTAINEERING EQUIPMENT**

BOOTS—The famous "LE TRAPPEUR"—FEATHER WEIGHT
—Combination hiking and climbing.

PACKS—"LAFUMA" Rucksack with tubular steel frame (Fifteen different sizes)—From \$3.50 and up.

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ICE AXES — PITONS — CRAMPONS, etc. . . .**

write or call for complete information

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→ **KELTY** Pack →



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From Canada: rugged, trouble-free fiber glass canoes by *Cadorette* and the famous canvas canoes by *Chestnut*. From England: the *Tyne* folding canoes. Backed by years of experience in know-how and design, all offer real savings to you. Write for catalogues and price list.

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Unsurpassed Relaxation
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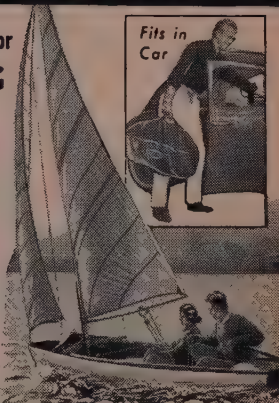
KLEPPER
Folding Boats

World-Famous for
**FOLDING
BOAT**

Leadership
Since 1907

SAIL · MOTOR
PADDLE

Guaranteed
UNSINKABLE



Unsurpassed for quality, performance, safety—Kleppers are used by more people than any other folding boats made. Klepper's compactness makes easy transportation by car, plane, train. Assembled quickly—without tools. Sail, motor or paddle it—your Klepper is highly maneuverable, swift, unsinkable—ideal boat for all family fun afloat... Distinguished by 4 world championships, 2 Atlantic crossings, many slalom awards.

Only KLEPPER Offers These Features:

Carry it like Luggage...
minimum storage space.
Patented Snap-Lock Fittings
make assembly
easy, correct every time;
accurate to 1/32".

Built in Air Tubes...
Guarantee maximum
safety and stability.
Economical...
No dockage. No trailer.
Low maintenance.



Also write for catalog
of KLEPPER TENTS...
Finest quality...
Made to fit your car

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Send FREE CATALOG AP: Boats ☐ ..Tents ☐

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Address _____

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A camp for boys ages 9 to 17.
Teaching the skills needed for
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trips.

AS 7-4054

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640 Hammond St.
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HIMALAYAN PAKS
THOMAS BLACK sleeping bags

Complete Line of
DEHYDRATED FOODS • TENTS

Mail orders filled

AS 7-4054

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RAIN BAN

jiffy spray waterproofing
keeps delicate parkas, ski pants DRY
NO stains — NO stiffening — NO smell
F. H. Wiessner Inc., Burlington, Vt.

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BOOTS
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LEATH-R-SEAL

— the really effective Boot and Seam Sealer
Boots stay dry, last longer
If dealer cannot supply, write
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FALL-LINE

Cake and Wipe-On Waxes
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Painstaking, controlled tests prove absolute superiority
Write for FREE sure-fire WAXING CHART
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Black's down sleeping bags
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FOR THE SUMMER:

Sleeping Bags filled with Down or Dacron. Bergan's Meis Rucksacks. Also small weekend Packs. Hiking Boots, Lederhosen, Brynje Health Underwear, Shirts and Pants.

Tennis and Badminton Rackets, Tennis Shoes, Tennis Balls.

Restranging service. Ski storage, repair and refinishing.

Free parking in the Madison Parking Lot at No. Station.

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Closed Saturdays
June, July and August

Tel. LA 3-2555



**SKI
EQUIPMENT**
for All

OLKEN'S

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Cedar 5-2835



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A Post Card Will Bring Our Latest Brochure

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THE FINEST . . .

In Lightweight PACKS
SLEEPING BAGS
TENTS
DOWN CLOTHING



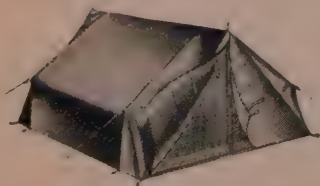
And a complete line of the world's best hiking, climbing
and camping equipment

It's EASY to order from *Gerry*—

We pay the postage

SEND FOR FREE CATALOG TO BOX 910, BOULDER, COLORADO

SEE 4 FLOORS OF TENTS ALL SET UP!



- Light weight mountain tents in nylon or pima.
- Light weight down or down and feathers sleeping bags.
- Domestic and Imported Rucksacks.
- Government surplus light weight tents and 40/60 Arctic Down sleeping bags.
- Climbing Boots, nylon climbing line, pocket stoves and wearing apparel.

ALL THIS AND MUCH MORE AT LOW OVERHEAD PRICES

Everything for the Camper! Not only all kinds of tents are here for you to look over but everything you'll ever need to make your camping and climbing comfortable and easy.

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one short block from North Station

CApital 7-9104

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from world-famous Thomas Black & Sons, Glasgow, Scotland

Compare value and price on our "No Risk" Approval Plan

Finest materials and hand workmanship

MUMMY AND SEMI-MUMMY DOWN SLEEPING BAGS

MOUNTAINEERING BASE TENTS

BACKPACKER LIGHTWEIGHT TENTS

EXCLUSIVE U. S. DISTRIBUTORS OF "TERYLENE" LIGHTWEIGHT
TENTS

EVEREST "VENTILE" CLOTH PARKAS

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"Specialists in Lightweight Equipment"

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Go to Sleep on Our Job

The Rest of Your Camping Days with
a Black's Sleeping Bag.

Black's Sleeping Bags are renowned the world over for their warmth and lightness. A range of prices and sizes to suit all purses and purposes. Write for details and learn how simple it is to order from Britain, with prompt delivery assured.



*for full details
of BLACK'S equipment
write for a copy of the fully
illustrated "Good
Companions" Catalogue—FREE.*

BLACK'S for

TENTS

SLEEPING BAGS

ANORAKS

CLIMBING BOOTS

Also a wide range of
Ropes, Rucksacs, Ice Axes, Ski-ing Gear



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For An Inexpensive
Family Vacation
Any Place—Any Season

BUY OR RENT
ONE OF OUR



APACHE CAMPING TRAILERS

- Opens quickly into large tent on a trailer.
- Polyfoam mattresses.
- Folds neatly into small, compact unit for easy traveling.
- Sturdy, lightweight, rustproof aluminum body.
- Sleeps 6.
- Three models.

We carry a full line of camping equipment

APACHE CAMPING CENTER

693 Turnpike St.

Canton, Mass.

3 miles south on Rt. 138. Take Exit 60 off Rt. 128
Just beyond Ponkapoag Golf Driving Range

Ralph Blakeman

Tel. Canton 6-3034

Jim de Pourtales



Available at Jordan Marsh Co., Boston

*it takes years
of wear
to realize
the quality
in this pair
of boots...*

CHIPPEWA MOUNTAINEER:

Experienced mountain climbers and guides wear the "original"® Chippewa Mountaineer. It's designed to stand the challenge of the roughest mountain country.

Full Grain Black Western Oil Tan upper. Stock gusset. Stock top facing. Brass eyelets and studs. Leather lace. Reinforced backstay. Reinforced outside counter pocket with hard counter. Sweat-proof insole. Leather lined vamp. Box toe. The lug sole, imported from Switzerland, proved itself in the Alps.

Suggested retail price of 8" boot shown (#5309) is \$24.95. 6" boot (#5230) is \$22.95. Insulated 8" boot (#4409) is \$39.95. On sale wherever fine footwear is sold. Or write for name of dealer (plus free Boot Care booklet).



Chippewa boots and shoes
"original"®
The Sportsman's Bootmaker
Chippewa Falls, Wis., Dept. I-607

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**complete trail
feeding**

with minimum weight
minimum cube
reasonable prices

Individual items or full prepackaged meals, portion packed for 2, 4 or 6 people in heat sealed plastic bags.

"TRAIL UNITS"

Complete meals—4 campers/1 day—in a box
11 x 11 x 4 1/2"—6 3/4 lbs.

Standard menus

Friday menus

Kosher menus

for full information and price list write to:

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THE GREATEST NAME IN RUCKSACKS AND CLIMBING PACKS

Made in France. 17 models retailing between \$2.95 and \$29.95. Brochure on request.

NO. 12 MEDIUM FRAME RUCKSACK

Waterproof canvas and bottom. Patented removable one-piece tubular steel frame. Perfect balance. High grade chrome-treated leather parts. Felt-lined shoulder straps. Three outside pockets. (Shown here front and rear.)

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*From A to Z—from
their history to their songs*

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SECOND REVISED EDITION

By Arthur A. Allen



The fascinating world of birds is detailed and pictured in this handsomely illustrated new edition of a classic work. MORE THAN 200 PHOTOGRAPHS—including 16 pages in FULL COLOR—and 76 paintings by Dr. William C. Dilger delineate physical characteristics.

19 comprehensive, up-to-date chapters range from the classifi-

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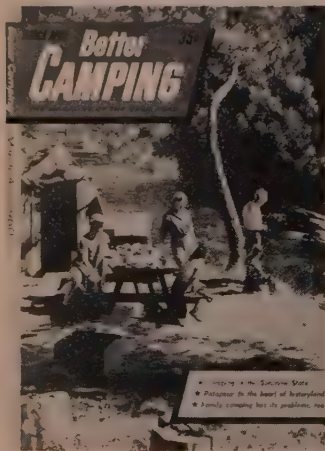
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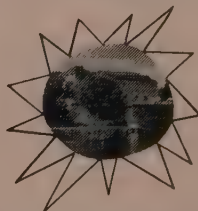
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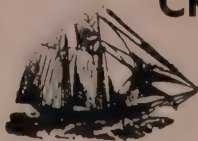
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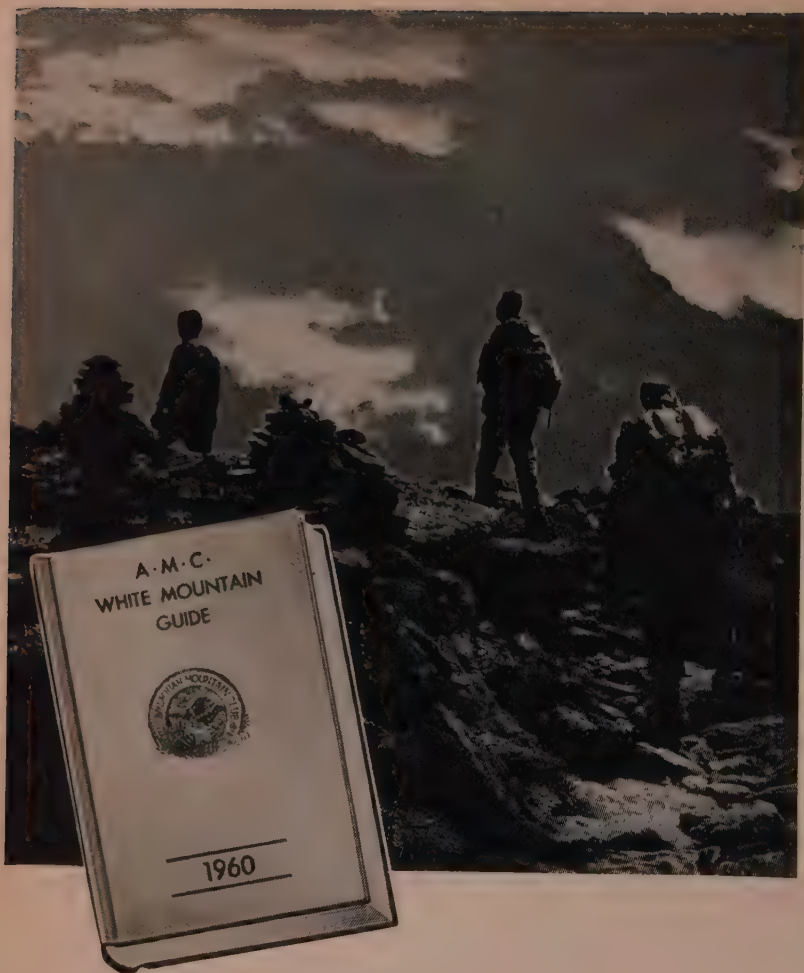
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APPALACHIA

New Series, Volume XXVII, June, 1961

Number 7

MAGAZINE NUMBER 132

APPALACHIAN MOUNTAIN CLUB

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For uniform binding, this issue constitutes No. 3 of Vol. XXXIII
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APPALACHIA

JUNE 15, 1961

MAGAZINE NUMBER 132

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George V. B. Cochran

STROLLING THE CANALITA

(See page 301)

NOTES ON MOUNTAIN CLIMBING IN ANTIQUITY

by ARTHUR STANLEY PEASE

THE HISTORY OF MOUNTAIN CLIMBING has been the subject of numerous discussions and many sweeping assertions have been made as to when and where it was first practiced. These have often had to be refuted by later and more sober criticism, and so widely scattered and frequently so recondite are the sources of our knowledge that dogmatism must be held in restraint and logical inference given precedence over mere guess-work.

In the present necessarily brief treatment I shall begin by asking what we mean by the terms "mountains" and "climbing" and shall, somewhat arbitrarily, restrict "antiquity" to the Old World prior to the sixth century of our era.

It is tempting to modern people, whose standards of height are obtained from the great mountains of North and South America, Equatorial Africa and the Far East, not to mention the Rockies and the Alps, to disparage the mountains of the Ancient World, especially when we note that many famous peaks rise to no lofty measurements. Thus Horace's beloved Mt. Soracte culminates at 2267 feet, the biblical Mt. Carmel at 1732, Acro-Corinth at 1886. We may become more respectful, however, when we find, as roughly comparable to our own Mt. Washington, the Greek Pelion (5074), Ossa (6488), Athos (6668), Oeta (7059), and Ida (8056). Carmel may be low, but what of Hermon (9230), Olympus (9548), the highest peak of the Apennines, Gran Sasso d'Italia (9558), Etna (10,705), Maladeta in the high Pyrenees (10,863), the snow-capped Cappadocian peak of Argaeus (12,844), the Moroccan Atlas (13,664), Ararat (16,941), and the Iranian Demavend (18,934)?¹ Most of those I have here enumerated were known, either by exploration or by distant view, to some of the Greeks and Romans, and in both Greece and Italy one is never far removed from peaks of very respectable grandeur. The wizard-sage, Apollonius of Tyana, according to his biographer, Philostratus (4,23), engaged in an inquiry—probably inspired by the sight of Mt. Oeta—to determine which was the highest mountain in Greece; but he reached a patriotic, moralizing

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¹ The altitudes here given have been taken chiefly from the recent atlas published by the London *Times*.

rather than scientific result, though others sometimes came fairly close in their reckonings.

Leaving unsettled the definition of "mountain", despite the protest of climbers of the 4000-footers in our Club membership, I shall next inquire, but perhaps inadequately define, the meaning of the term "climbing". Here caution is needed, for we must lay aside modern explanations largely based on the terminology of sport, unless we call it sport when (in 101 B.C.) the naked Teutons made their way through the ice and snows of the Alpine ramparts of Italy and then, pulling their broad shields under them and letting go, slid down the smooth and deeply fissured cliffs. Rock climbing, as I shall show, was known as a military accomplishment rather than as a sport, and so too were skiing, the breaking of time or distance records, and such activities.

Rather than defining the different kinds of records, let me ask for the motives which led men, and more rarely women, to go upon the mountains. First and simplest was probably the need to drive flocks and herds from the summer heat and parched herbage of the lowlands to the cooler pasturage and water-springs of the higher regions. This activity finds a literary expression in the bucolic poems of Theocritus and in Virgil's *Eclogues*, and has been continued in Alpine pastures to the present day. By such herdsmen, as by occasional parties of traders, exchanging the products of North and South (cf. P. H. Scheffel, *Verkehrsgesch. d. Alpen*, 1, 1908), the meadows of expanding passes were naturally more sought than sterile rocks or icy peaks, and the presence of Roman coins found along the Julier (7500 ft.) and the Théodule (10,900 ft.) Passes, and inscribed bronze tablets of thanksgiving set up along the Great St. Bernard (8110 ft.), attest the ancient passage through such districts.

Next in importance in the resort to high mountain passes was probably their military use, and here there may first occur to the reader the passing of Xenophon and his army of Ten Thousand (400 B.C.) through the snowy mountains of Armenia and, secondly, the leading by Hannibal (218 B.C.) of a large army, accompanied by elephants, through the Alps. The first of these campaigns is described by the commander himself in his *Anabasis*, the second by the lively pen of the historian Livy, with details from the more sober narrative of Polybius (Liv. 21,38,6; Strabo, 4,6). Livy's account well shows the possibility of divergences in the identification of the route which Hannibal followed, a disagreement not yet settled. (For eleven or even more passes apparently available and at that time already known to the Romans, see W. W. Hyde in *Class. Journ.* 11 (1915), 78-79, n.1).

In these two campaigns we find the passage of large military forces at one time; in some other historic incidents the moun-

tains are sought as places of refuge—e.g., for the murderers of Sennacherib (681 B.C.), who fled to Mt. Ararat. (Cf. *Isaiah*, 37, 38; the A.V. reads here not Ararat but Armenia.) So, according to Herodotus (8,32), the Phocians fled from the Persians by climbing to the top of Mt. Parnassus (8043 ft.).

At other times the views from high mountains furnished extensive military reconnaissance, almost like ordnance maps. Thus Philip V. of Macedon in 181 B.C. (according to Livy, 40,21,2—40,22,4) climbed Mt. Haemus in Bulgaria (8060 ft.) because he had mistakenly accepted the common opinion that thence could be seen all at once the Pontic and Adriatic seas, the mouths of the Danube, and the Alps. To have these spread out before his eyes would have, he thought, no small weight in determining his strategy in a war with Rome. But Polybius (34,12,1) denies that this extensive view is possible. Note that Strabo (12,2,7) says that persons who ascend Mt. Argaeus—"but they are not many"—say that in clear weather both the Euxine and the sea of Issus are visible.

The perils of high climbing are most of them recognized by one or another author. Hannibal, in his crossing of the Alps, anticipated and encountered severe cold, against which he provided warmer clothing for his soldiers (Livy, 21,31,8). Men and pack animals slipped in the snow (Polyb. 3,54,1; Sil. Ital. 3,477-479), and were exposed to avalanches (Strabo, 4,6,6), and St. Jerome, *Commentary on Isaiah*, p. 639, Vallarsi, is perhaps describing crevasses in the Alps: "In very violent cold and in caverns inaccessible to the sun water is said to harden into crystal, making it in touch a stone, to the sight water". The unmelting ice of ages is vividly described by Livy (21,35,7; 21,36,2) as not the least of Hannibal's problems. At a later period St. Augustine (*De Gen. c. Manichaeos*, 1,24) speaks of observations about the summit of Mt. Olympus, made by those who go up annually for stated sacrifices (cf. id., *Quaest. in Heptateuchum*, 1,10), who reported that the rarity of the air on the summit was such they could stay there only by applying wet sponges to their nostrils. Some of the sufferings endured suggest those which afflicted Xenophon's army in the highlands of Armenia, where the soldiers suffered from *bulimy*, or ravenous hunger (*Anab.* 4,5,7; Plutarch, *Quaest. convivales*, 6, p. 695 d), as well as from frozen toes and snow blindness (which they sought to avoid by holding black cloths before their eyes). High winds are also mentioned as a peril, but a modern climber would probably not describe a risk noted by St. Hippolytus (third century), who says that those who ascend Mt. Ararat suffer also from demons (frg. on the *Pentateuchum*, in *Patrol. Gr.* 10,709 c-d). This seems less an account of actual experiences of climbers than someone's excuse for not performing an expected pilgrimage, for malevolent

as well as benevolent gods dwell upon the high places. Some climbers suffer from the cold in these mountain ascents, but Aristotle's pupil Dicaearchus (fourth century B.C.) speaks of those who in hot weather seek relief by climbing to the summit of Mt. Pelion (see *Geogr. Gr. minores*, I, p. 107). On the other hand, Strabo (6,2,8) had talked with some recent climbers on Mt. Etna who had been forced to turn back because the ashy summit became hotter and less bearable to their feet—which strongly suggests Horace's *Odes*, 2,1,7-8. It was not always windy at the top, for Olympiodorus on Aristotle's *Meteorology* (1,3,22; 2,4,171) reports the calmness prevailing on the summit of Mt. Cyllene, where a message written in ashes remained undisturbed by wind till the next year (cf. Ps. Aristotle, *Problems*, 36,36).

In addition to warm clothing, wet and black cloths, etc., mentioned above, some other aids to the mountaineer may be listed. Strabo (11,5,6) writes of the Caucasus: the summits of the mountains are impassable in winter, but the people ascend these in the summer by fastening to their feet broad shoes made of oxhide, like drums, and furnished with spikes on account of the snow and ice. They descend with their loads seated upon skins, as is the custom in Atropatian Media and on Mt. Masius in Armenia; there, however, the people fasten wooden disks furnished with spikes to the soles of their shoes. Xenophon in the *Anabasis* records that the Armenians showed the Greeks how to protect the feet of their horses and beasts of burden from the deep snow by wrapping small bags around them (4,5); without these the animals would have sunk up to their bellies. Strabo (11,14,4) speaks of passes over the mountains where whole caravans are often swallowed up by blizzards, and to meet such dangers people carry staves, which they raise to the level of the snow to get air to breathe and to signify their plight to those who may come to their rescue. Plutarch (*Marius*, 23,3) says that the hardy Teutons endured snowstorms without any clothing, made their way through ice and deep snow to the summits, and from there slid down the smooth cliffs on their broad shields (see above).

Arrian, in his account of the *Anabasis* of Alexander the Great (4,19), says that Alexander reached the Rock of Sogdiana,² which was protected by vertical cliffs. There he selected three hundred men who had practiced rock climbing, and collected the iron pegs

² Sogdiana, a district of ancient Persia, was roughly the modern Soviet Uzbekistan, the region of Bukhara and Samarkand. The "Rock of Sogdiana" was an almost inaccessible mesa probably located near Derbent, about 100 miles south of Samarkand. It was where Oxyartes of Sogdiana kept his wife and beautiful daughter Roxane, later married by Alexander. (Cf. Pauly-Wissowa, *Realencycl. d. class. Altertumswissenschaft*, vol. 2 (1896), 812-3, and half-vol. 36 (1942), 2017-9; also, Lewis V. Cummings, *Alexander the Great*, Boston, 1940.)

with which their tents were pegged down and fixed them in the snow, where it appeared frozen hard, and if any place bare of snow was found this they bound with strong linen ropes. They set out in the night to the part of the Rock which was most sheer and so had been left unguarded. Then they fixed the pegs, some into the ground, where it was visible, some into the snow where it seemed least likely to give way, and then hauled themselves, one by one way and another by another, up the face of the cliff. Some thirty perished in the attempt . . . the rest, however, reached the top about dawn and seized the summit. (Cf. Philostratus, *Life of Apollonius of Tyana*, 2,10, who makes this rock 9000 feet high!) Another case of the use of climbing ropes is found in Salust's *Jugurtha*, 93-94, describing how a Ligurian soldier in the army of Marius, while collecting snails on a sheer cliff in Numidia, found a route by which he later led up Roman soldiers to capture an undefended crag, on the way up easing the passage for the Romans by throwing nooses around rocks and tree-roots. When Livy (21,37,6), describing the famous crossing of the Alps by Hannibal (in which the Carthaginians heated a rocky passage by fires and then made the rocks crumble by pouring vinegar over them), then states that the invaders made their way by the use of iron tools, it may be that this also should be considered as the use of pitons. In any event, the instances I have cited seem to show the early forms of various types of climbing equipment—rope, pitons, alpenstocks, snowshoes, sleds, etc.

I pass now to religion as an important element conducing to the ascent of mountains. High and conspicuous summits used as the sites of sacrifices are mentioned as early as Homer (e.g., *Il.* 10,160) and are very often spoken of in the Old Testament. Herodotus (1,131) says that the Persians regarded the whole circle of the heavens as Zeus and offered sacrifices to him on the high peaks of mountains. Cf. Xenophon, *Cyropaedia*, 2,7,2; *Memor.*, 3,8,10, where Socrates says that for temples and altars the most suitable sites are those which are conspicuous yet remote from traffic, since "it is pleasant to breathe a prayer at the sight of them and to approach them filled with holy thoughts". (See also Strabo, 15,3,13; Origen, *C. Cels.* 5,44.) The number of such chapels and altars was large, as is attested both by literary references and by ruins (cf. F. v. Andrian-Werburg, *D. Höhencultus asiat. u. europ. Völker* (1891); W. W. Hyde in *Class. Journ.* 11 (1915), 74,n.). For mountain cults see R. Beer, *Heilige Höhen d. alt. Gr. u. Röm.* (1891); C. Albers, *De Diis in Locis editis cultis apud Graecos* (1901); and especially A. B. Cook, *Zeus*, 1,117; 2,818-987; 3, x-xi (1940); H. J. Rose in *Oxf. class. Dict.* (1949), 581; Johanna Schmidt, *Heilige Berge Griechenl.* (1940). Not a few of such sites have been more or less maintained to the present time. On Mt. Pelion people went up for sacrifices at the rising

of the dog-star (Dicaearchus, frg. 60 Müll.). Mt. Oeta was appointed by Heracles as the site for his funeral pyre (Sophocles, *Trachin.* 1191-1278), and Hyllus tells him that he has often been there in the worship of Zeus. The Emperor Julian, according to Ammianus Marcellinus (22,14,4), climbed Mt. Casius near Antioch to sacrifice to Jupiter, and Strabo (16,2,8) speaks of festivals of the Syrians there in honor of Triptolemus. The Bithynians from mountaintops call upon Zeus and Attis (Eustath. ad *Il.* 5,408), and Pausanias (8,17,1) reports that on the summit of Cyllene (7789 ft.) was a ruined temple of Hermes (cf. Geminus, *Elem. Astron.* 14).

Many of the mountaintop places of sacrifice were doubtless roofless, so that the sacrificial fires might be better visible, but in some cases small huts were erected as protection for the worshippers against the elements. Remains of such are rather scanty, for though the foundations were of stone the superstructures were of wood or even reduced to mere tents. At the famous but variously located Mount of the Transfiguration, described in *Matt.* 17,4 (cf. *Mk.* 9,4; *Lk.* 9,30), Peter proposes to set up three tabernacles (i.e., tents) for Jesus, Moses and Elias, and though his suggestion was not carried out the presence of St. Elias on mountaintops has been rather frequent, as some think supplanting the earlier sun-god, Helios. St. Jerome (*Ep.* 108,13,6) describes the ascent of Mt. Tabor (1843 ft., where he says that Jesus was transfigured) by the holy woman Paula, and tells of mountains and other features in the view thence. John Ruskin, in *Modern Painters* (1884 ed., 4,196) further discusses the prominence of mountains in other parts of the Gospel narrative. Sacrifices to the crater of Mt. Etna and mention of the mountain in the anonymous Latin poem called the *Aetna* continued the traditional connection of that peak with the philosopher Empedocles (fifth century B.C.), who was thought to have sought the reputation of having become a deity by plunging into the crater, and a small ruined hut is still called the Torre del Filosofo, though it really dates from the Roman period, perhaps from the time (123 A.D.) when the Emperor Hadrian climbed the mountain to witness the sunrise, which is many-hued, like the rainbow (Spart. *Hadr.* 13,3).

Sometimes herdsmen and others not only ascended the higher mountains for longer or shorter periods, but Strabo (7, frg. 33) speaks of persons who live on the crest of Mt. Athos, saying that they see the sunrise three hours earlier than those on the seashore. (Save for a passage in Marcus Aurelius (10,23), this is almost our only reference to the significance of sea-level in the establishment of mountain altitudes.) Plato (*Theaet.* 174 d, quoted by Marcus Aurelius, l.c.) speaks of herdsmen living in their mountain pens, but Marcus's own motto is "live as on a mountain" (10,15).

On Mt. Argaeus, at nearly 13,000 feet, are found various rock-hewn dwellings (cf. H. F. Tozer, *Turkish Armenia, etc.*, 115-127), indicating stays of some length.

Various religious orgiastic cults, particularly those of Dionysus and Pan, are at times represented in mountain nocturnal revels, in what were called *oreibasias*, "mountain-roaming" (cf. Sophocles, *Oed. Tyr.* 1100; Strabo, 10,3,23; Max. Tyr. 17,2; Nonnus, 16, 184). A typical case is found in Euripides, *Bacchae*, for nocturnal revels over Mt. Cithaeron (cf. Virgil, *Georgics*, 286-289); but these somewhat romantic passages deal with mythological rather than historic incidents. Cf. also the story of King Hesperus, who climbed to the top of Mt. Atlas and who, while watching the stars, was snatched aloft and made a star himself (Diodorus, 3,60,4).

Another important stimulus to mountaineering is to be found in scientific and philosophic curiosity. Pliny the Elder (*Nat. Hist.* 25,3) recognizes those searchers of trackless mountain heights who have sought out plants attractive for food or helpful as medicines. An interesting passage (2,5) in the life of Apollonius of Tyana (second century A.D.) represents that curious character as asking his companion Damis where they then were. "In the Caucasus. . . . Yesterday I was walking along where a great many people go, but today where there are very few . . . today we are ascending through an untrodden and divine region; for you heard our guide say that the barbarians declare this tract to be the home of the gods. . . . Can you tell me, then, . . . what understanding of divine mystery was got by walking so near the heavens?" "None whatever," Damis replied. "And yet you ought," said Apollonius, "when your feet are placed on a platform divine and vast . . . you ought at once to utter thoughts of the clearest kind about the heavens and the sun and moon . . ." "Whatever," said Damis, "I knew about God's nature yesterday I equally know today, and so far no fresh idea has occurred to me concerning him." "So, then, . . . you are as far from heaven as you were yesterday." "I thought," said Damis, "I should anyhow go down from the mountain wiser than I came up to it, because I had heard that Anaxagoras of Clazomenae [fifth century B.C.] observed the heavenly bodies from Mt. Mimas in Ionia, and Thales of Miletus [sixth century B.C.] from Mycale, close by his home, and some have used as their observatory Mt. Pangaeus [in Macedonia] and Mt. Athos," etc., and more to the same effect, since the pure soul will soar higher than Caucasus. Theophrastus (*De Signis*, 4) says that other mountain observers, to study phenomena in the heavens, involve themselves on dizzying cliffs, where they can go neither up nor down—a situation also described by Philo (*De Providentia*, 2, p. 65 Aucher). Petronius, however (88,4), says that Eudoxus (fourth century B.C.) grew

old on the summit of a very lofty mountain while studying the motions of the stars and the heavens, and Eusebius (*Praep. Evang.* 8,14, p. 391 b-c) quotes Geminus (first century B.C., *Elements of Astronomy*, 14) for observations above the clouds on the top of Mt. Cyllene (highest in the Peloponnesus) and Atabyrius in Rhodes. Pythagoras (fifth century B.C.), according to Iamblichus (*Vita Pyth.* 3,14-15), often ascended Mt. Carmel and lived at times as a hermit at the temple there. (It was at that same mountain that Elijah encountered the priests of Baal; cf. *I Kings*, 19,18ff.). St. Augustine, who seems to have been interested in mountains—at least for homiletical purposes—draws comparisons (*Enarrat. in Ps.* 148,9; cf. *De Trin.* 9,11; *In Ep. Ioan. ad Parthos*, 10,5) from men who on summits see below their feet clouds and rain; so we are asked to imagine a view from the highest point on earth. In his *De Gen. c. Manichaeos* (1,24), Augustine refers to observations made at annual sacrifices on Mt. Olympus. According to Strabo (6,2,8) the town of Etna in Sicily provided entertainment and guides for persons climbing Mt. Etna, and Empedocles was thought to have been of the number of such explorers (cf. Horace, *Ars poet.* 464-466; Diog. Laertius, 8,68; Anon. *Aetna*, ed. R. Ellis, xxxii-xxxiii; Seneca, *Ep.* 79,2-7, who asks his friend Lucilius to climb Etna and make observations upon certain matters affecting its height and possible changes in altitude).

One purpose of such scientific calculations was to estimate the heights of various peaks. Plutarch (frg. 150,7,180-181 Bernardakes) speaks of "men who understood mechanics by the instruments with which they are accustomed to measure mountains". The unit of measurement was commonly the stade (ca. 606 ft.), and Plutarch (*Aemil. Paul.* 15,6-7) says that the geometers assert that no mountain is so high and no sea so deep as to exceed ten stades; yet Olympus, measured by Xenagoras, son of Eumelus, is credited with ten stades *plus* 96 feet, measured, says Plutarch, according to rule and with instruments. All the same Martianus Capella (2,149) reckons Olympus at barely ten stades. Strabo (4,6,12) contrasts the Greek mountains with the loftier Alps. The Alps are harder to climb, taking more than five days, but the Greek mountains can be ascended in a single day each, and the circuit may be made in the same time. Even careful writers, like Geminus and Aristotle's pupil, Dicaearchus, are often at fault in their estimates of heights (cf. W. W. Hyde in *Class. Journ.* 11 (1915), 75, n.2), but Strabo (8,6,21) reckoned the height of Acro-Corinth within 213 feet of its real altitude. The lack of a strict standard of counting from sea-level vitiates some of the estimates collected by Hyde (see note above). Strabo's account (6,2,8) of what recent climbers had reported of the condition of the top of Etna reads as though it were reasonably

accurate. (A modern treatment of the whole question is that of W. Capelle, *Berges- u. Wölkenshöhen bei gr. Physikern*, 1916.) Pliny (*Nat. Hist.* 2,162) says that Dicaearchus, with the support of royal patrons, calculated the heights of various mountains and decided Pelion to be the highest; but Pliny doubts this result, for he has known much higher peaks in the Alps.

A specialized and at times important use made of high peaks was when beacon fires were employed, mostly in war, to carry to a distance significant information. On this subject of "Telegraphing among the Ancients" see A. C. Merriam in *Papers of the Arch. Inst. of America*, 3 (1890), 1-32; W. W. Hyde in *Bull. Phila. Geogr. Soc.* 13 (1915), 2,13-14; 3,20-21. The most striking case of this is given at the beginning of the *Agamemnon* of Aeschylus (8-316), where a sequence of fires on eight peaks conveys to Argos the news of the fall of Troy. If history rather than legend is demanded one may note what Xenophon (*Anab.* 4,1,11; 4,4,9) says of the kindling of beacon fires by the Kurds. At other times (e.g., Livy, 21,24,1) smoke signals were employed; cf. the pillars of cloud and fire in *Exod.* 13,21.

A few miscellaneous statements may be here combined. Pausanias (1,21,3) says that he himself ascended Mt. Sipylus (5900 ft.). Dio Cassius (76,13,8) describes Atlas as snow-covered, and says that no one has ever ascended it. Methodius, Bishop of Olympus (in Lycia), in his work on the Resurrection (1,14; 2,8), tells of seeing fire bursting from the ground on Mt. Olympus. Arrian (*Peripl.* 1) says that Hadrian climbed Mt. Theches to see where Xenophon and his army first saw the Euxine Sea. According to Plutarch (*Fab.* 7,1), the Spaniards accompanying Hannibal were experts at mountain roaming; in Plutarch's *Marcus Cato* (13,3), Lucius Manlius appears as an expert mountaineer, whose skill was helpful to Cato at Thermopylae (191 B.C.).

The subject of the appreciation of the beauty and grandeur of mountain scenery lies somewhat outside the area of this present discussion and has been well treated by various scholars. See, e.g., J. C. Shairp, *On Poetic Interpretation of Nature* (1890), 143,158; H. R. Fairclough, *The Attitude of the Greek Tragedians toward Nature* (1897); W. R. Hardie, *Lectures on Class. Subjects* (1903), 11-22; W. W. Hyde in *Bull. Phila. Geogr. Soc.* 13 (1915), 122, who concludes that the Greeks preferred quiet and domesticated scenery—with the striking exception of the *Prometheus Bound* of Aeschylus—as opposed to imposing or terrifying sights; E. E. Sikes, *Roman Poetry* (1923), 138ff., who on p. 145 quotes from Mme. de Staël: "Glades, flowers, and streams satisfied the poets of paganism; the solitude of the forest, the boundless ocean, the starry heavens can scarcely express the eternity and infinity with which the Christian spirit is filled";

Bernert in Pauly-Wissowa, *Realencyclop. d. class. Altertums-wissenschaft*, 32 (1935), 163; H. de Ségogne and J. Couzy, *Les Alpinistes Célèbres* (1956).

It may well be conceded that the accounts of distinguished persons climbing mountains to see the mountains at sunrise (like some modern Easter-morning events) combine elements of both religion and esthetics, and that these combinations probably are now, and were in antiquity, more frequent than we may at first thought recognize. Possibly there is a helpful suggestion in Strabo (13,4,5), who reports that on Mt. Tmolus (ca. 6000 ft.) near Sardis there rises a blessed mountain, with a look-out on its top—an arcade of white marble, the work of the Persians—with a fine view of the country all about. Nor should we overlook the 'Alpine glow' on Mt. Ida described by Lucretius (5,663-665); or the witness of Alexander of Aphrodisias on Aristotle's *Meteorology* (1,13,57), who says that the Caucasus is lighted long after sunset and long before sunrise, so that the night is but four hours long (cf. Baedeker's *Southern Italy* (1908 ed., p. 400) for a good description of the sunrise over Mt. Etna). And finally, for tremendous implications couched in few words, there is Plato, *Phaedo*, 116 e, where Crito says: "I think, Socrates, that the sun is still upon the mountains and has not yet set".³

³ Socrates, condemned to death by the Athenians on the absurd charge of "corrupting the youth" but really because his moral teaching was beyond their comprehension, was allowed to become his own executioner by drinking poison hemlock, which he was to do at the close of a certain day. On the day in question a group of his faithful friends and disciples gathered in the prison to converse with him for the last time. He chose to spend these final hours, as usual when in such company, in philosophical discussion, his topic on this occasion being the very pertinent one of the immortality of the soul. He had just finished establishing this thesis to the general satisfaction, and sketching his own view of the future life, when the jailer entered to announce apologetically that it was time to take the fatal drink. Thereupon Crito, one of the friends, made the remark quoted, meaning that, with the sunlight still visible on high, the day had not yet come definitively to a close and consequently some moments of respite might still be claimed. Socrates, however, refused to request any delay and with perfect calmness drank off the poison. It is commonly held that Plato's description, here in the *Phaedo*, of the death of Socrates is one of the greatest passages in world literature.—Ed.

CLIMBS IN THE CORDILLERA REAL

by GEORGE V. B. COCHRAN

THE CORDILLERA REAL OF BOLIVIA is a great backbone of peaks one hundred and twenty miles long, located sixteen degrees below the equator and partially surrounding the Altiplano, the great plain, 13,000 feet high, which forms the core of the Andes. Because of favorable weather conditions and ease of access the region offers fine climbing, including at least eight summits of more than 20,000 feet, and many possibilities for first ascents of more than 17,000 or 18,000 feet. Mining roads approach within an easy march of almost any objective. Climbing, at least on smaller peaks, is possible all the year round, with the best months in the fall, from April through June, followed by the somewhat colder weather of the Bolivian winter when blue skies prevail almost every day, even around the higher peaks. Somewhat paradoxically, snow comes to the Altiplano in the spring and summer, so that during the fall and winter the snow is old, firm, and perfect for crampons, while there is practically no avalanche danger.

On Mt. Chacaltaya, two hours' drive from La Paz, a ski lift operates from October to June and can frequently continue all year round. Although snow remains throughout the dry winter, the sun converts it into fields of icy *nieves penitentes* which make skiing difficult. Chacaltaya's lift was built in 1942, the first in South America. Unfortunately, the skier who plans to fly to La Paz and dash up to ski the next day is not likely to get very far. La Paz has the only airport (13,500 feet) in the world where one feels the need of oxygen on getting off the plane, and even the strongest chubber¹ from Tuckerman Ravine is likely to turn a little blue for a few days on this, the world's highest ski lift. The base of the run lies at more than 16,000 feet, the top at nearly 18,000!

Last summer, in the course of a ski trip to Chile, I was fortunate enough to stop in La Paz with the hope of skiing at Chacaltaya and perhaps climbing. Since I was without contacts in Bolivia, the latter prospect seemed dim until I got in touch with the Club Andino Boliviano, whose members received me with great enthusiasm and hospitality and did everything they could to help me see their impressive mountains.

GEORGE V. B. COCHRAN, M.D., of Chappaqua, N. Y., a Club member, is an orthopedic surgeon in residence at the Columbia-Presbyterian Medical Center in New York City. For two years he was a flight surgeon in the Air Force. He is a climber and skier of much experience and the author of several articles on these activities (see for instance "The Mysterious Plateau" in *APALACHIA* for June 1958).

¹ Avid outdoorsman (Dartmouth slang). One whose main pursuits are such things as climbing, camping and skiing (away from lifts, of course).

The Club Andino Boliviano is a large organization, resembling the Appalachian Mountain Club, whose primary concern seems to be skiing and maintaining the ski lift and the *refugio* on Chacaltaya. They also sponsor an active program of competition. In addition, there is a small but dedicated group of climbers headed by Douglas Moore, a Bolivian gentleman of English extraction, who has a very impressive record of multiple ascents of almost all the 6,000-meter (*ca.* 19,600-ft.) peaks in Bolivia, as well as many first ascents and a number of significant climbs elsewhere in South America.² Unfortunately, on my arrival I found that he had just returned from a vacation on Illimani and was consequently unable to accompany me. But he furnished untold amounts of advice and equipment and organized the group for the climbs. This was led by Hector Lazarte, one of Bolivia's best young climbers, who proved to be a dependable and excellent companion under every condition.

Thus the Club Andino welcomes outsiders, particularly North Americans interested in climbing, whether it be for coffee in their clubrooms or for the most ambitious climb. It might be mentioned here that while it is possible to borrow any other kind of climbing equipment in La Paz, proper high-altitude clothing is in short supply, and I was very glad to have my own down jacket, overboots, and similar items. Indeed, only the foremost Bolivian climbers have even a minimum of what is normally considered adequate. Because of the great prevalence of excellent weather as well as the high cost of such equipment in their country, the Bolivians seem to have developed a rather cavalier attitude toward the possibility of injury or severe weather, or various other emergencies which can be so dangerous at such altitudes.

Five days after my arrival in La Paz, Hector and I, along with a medical student named Franz, set off for the first climb, a small peak known as La Cumbre Chircura (*ca.* 16,500 ft.) which lay east of the city. To reach it we rode the *Ferrocarril*, a strange concoction consisting of an ancient bus which runs on railroad tracks and climbs a thousand feet up from La Paz to El Alto, near the airport, and thence across the Altiplano to a pass leading to one of the deep and beautiful semi-tropical valleys of the Yungas. These fall abruptly and connect the Altiplano to the tropical lowlands of the Amazon basin. Getting off at a station advertising an altitude of 4650 m. (*ca.* 15,400 ft.), we made the peak, about two miles away, in an easy two and one-half hours—quite enough for the first exercise at that altitude!

Two days later we set out as a party of five for Ayllaicu, a

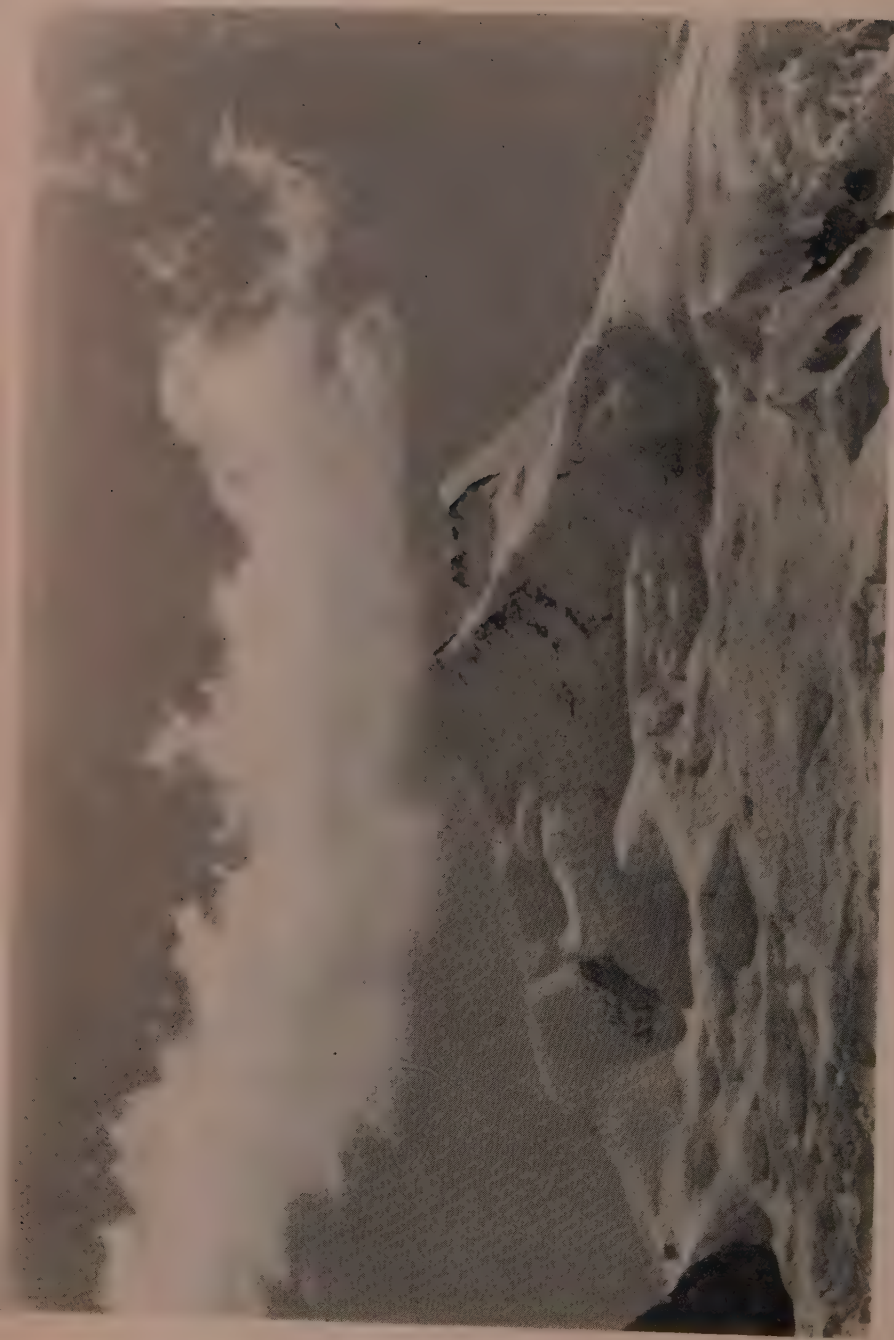
² For additional information on the Cordillera Real and Douglas Moore, see "Our Climbs in Bolivia" by Hans Ertl, *The Mountain World*, 1953.



George V B. Cochran

DESCENDING FROM THE SUMMIT OF HUAYNA POTOSI

Caca Aca in the Background



SUMMIT OF HUAYNA POTOSI

George V. B. Cochran

peak of 5300 m. (*ca.* 17,500 ft.). After a two-hour drive from La Paz in the truck of a dentist bent on some distant "hut" calls, the climb began at another entrance to the Yungas, the 15,400-foot Zongo Pass. Here at nearly the altitude of Mont Blanc we found the source of the La Paz water supply, a lake and dam lying in the narrow saddle of the pass, with the snows of Huayna Potosi (20,404 ft.) rising to the north and a multitude of peaks including Ayllaicu to the south. The Altiplano rises gently to the pass, but on the east side, bordering the Yungas, the slopes fall abruptly below the dam while a long wall of cliffs fans out on either side of the road which hairpins its way down the precipitous slope between. As the climbs of both Ayllaicu and Huayna Potosi begin a mile or more away from the road, such an obstacle would ordinarily entail a long detour, but the Bolivians had another method. Small channels or *canalitas* were cut in the face of the cliff and ran for miles north and south of the dam, bringing water from distant glaciers. The edge of the canal was the path, and the trick was to walk along this ten-inch-wide stone-wall which formed the outside of the channel and keep from hitting the frequently overhanging rocks with one's pack, while maintaining a fast pace for a mile or so without stopping to dwell on the consequences of a misstep! Since my companions, of course, set off as if they were in the middle of El Prado, we were soon at the foot of the climb.

After this introduction, the climb itself was an anticlimax. Putting on crampons we went up the heavily glaciated and only moderately steep slopes without much difficulty, reaching the top about three hours after leaving the road. The weather was beautiful except for a wind of hurricane force that tore over the summit and a great pile of cumulus which hung over the edge of the Yungas valleys but never could surround the adjacent peaks. Across the way rose a very difficult-looking virgin peak of over 19,000 feet, and again to the north the great Huayna Potosi, which I then decided must be the next project. As the effects of altitude and poor condition were still all too apparent in my blue fingernails and pounding pulse, it seemed best to leave this until returning from Chile.

Thus on August 19, three weeks later, I was back at the lake on the Zongo Pass with Hector, Franz and Franz's father, ready to start up Huayna Potosi. One of Bolivia's giants, Huayna is a buttressed pyramid of rock and ice rising to 20,404 feet; like Illimani (21,269 ft.) it dwarfs all surrounding peaks and dominates the Altiplano for many miles.

As the climb involved a rise of 5000 feet and a distance of several miles, we planned to spend two nights on the mountain, and so arrived at the pass with a great stack of provisions bought

the previous day in the Indian black market in La Paz. This apparently legal, open-air operation is in full swing two days a week and sells only smuggled goods at prices considerably lower than elsewhere. After involved bargaining we had gathered a three-day supply of food for four people for the imposing sum of 180,000 Bolivianas (\$15). At least it is easy to be a millionaire in La Paz! Unfortunately there is not much demand for the usual mountaineering menus in Bolivia and our supply was a variety of heavy things more suitable for a lumber camp than for a high-altitude climbing expedition. Nevertheless it was all stowed away and we again started along the *canalita*, now in the opposite direction from Ayllaicu. After endless strenuous detours to avoid ice on the wall, we got over to where the climb really began, almost two miles north from the road. Leaving the canal we toiled up terrible sliding screes to the foot of the glacier at 16,000 feet, where we thankfully put on crampons and slowly worked our way up toward our campsite 1500 feet higher. It was long hot work, but once there, we were encouraged to find ourselves higher than the occasional DC-3 of the Lloyd Aereo Boliviano which labored over the pass far below!

The camp, of necessity, was placed in the only sheltered spot of the whole climb, beneath some cliffs at 18,000 feet. As there appeared to be much loose stone on the 200-foot cliff, we hacked out a tent platform hard by the rock beneath an overhang and hoped for the best. By this time every movement was an effort, but we just managed to get crowded crossways inside the two-man tent and begin the tedious task of cooking dinner when darkness fell promptly and very coldly at 6.30.

During the interminable 12-hour night the temperature fell to zero and the cold so slowed us down in the morning that it was 6.30, with dawn breaking, by the time we got outside. We now found ourselves reduced to a summit party of two, since Franz's father was suffering severely from the altitude, and Franz not only wished to stay with him but was troubled with wet boots, as he had not had overboots the previous day. Perhaps unwisely, Hector and I went on alone, taking the greatest precautions to protect ourselves from unexpected falls into crevasses. Climbing the snow above the rocks, we soon came on one of the major obstacles of the climb, the so-called ice wall, a narrow tilted slope of ice, perhaps 300 feet high, lying astride a ridge at an angle of 40 to 50 degrees. It was the only way to pass the great upper glacier which surrounded the summit pyramid on two sides. On the left lay a lower glacier basin, separated from the upper by a huge ice cliff and then the almost vertical face of the subsidiary summit, Caca Aca (20,280 ft.). To the right the ice slopes fell sharply to the Yungas. Senor Moore had warned of the possible

difficulty if hard ice were found at this key point, but we were lucky that day; conditions were ideal, with the surface of the ice fluted by the sun and just soft enough to be perfect for crampons. Up we went without cutting a single step. A short time later we were abroad on the vast expanse of the upper glaciers, but as we progressed we could not be sure exactly where the true summit lay or see a way to pass the large overhanging bergschrund. Consequently we avoided heading directly for the southeast side of the summit which lay straight ahead and kept to the right, climbing the glacier for over a mile to reach the rocks of the northeast ridge. Spotting the summit from there we were able to cross the bergschrund on a firm ice-bridge; then, doubling back, began climbing diagonally upwards along the east face of the summit mass. Here again we were in luck. Ahead came a long traversing climb up a slope at least a thousand feet high which was surfaced with hard ice and frequently reached a 50-degree angle. Nevertheless we went up rapidly and easily, thanks to the *nieves penitentes*. These innumerable vertical plates of ice covered the slope like spines on the back of a dinosaur, and were set just right to convert a potentially difficult place into a virtual staircase. A couple of hundred feet below the summit we passed beneath an outcropping of rock and then belayed each other up a short ice gully where we hacked a few steps and crossed the ridge onto the smoother but equally steep southeast side of the peak. A few minutes more and we were on top, five and three-quarters hours after leaving the tent. As we had got a late start for a climb normally expected to take seven or eight hours, we were glad that the two-man rope and superb climbing conditions had allowed such a saving of time.

Since the summit was a corniced ridge overhanging the terrific drop of the northwest face, which fell in one sweep to the Altiplano, we took good care to keep well clear! There were none of the hurricane winds of the summit of Ayllaicu, which would have made this exposed climb almost impossible, and it was comfortable even without a parka. No need for the heavy pack of high-altitude clothing we had carried along! (But two days later from the airport, I watched the rare sight of a sudden squall racing across the Altiplano to engulf the peak, and was glad to have been prepared.) Before we left Hector unfurled his Bolivian flag, for photographs against the background of Illimani and Mururata to the south and east. Farther to the east we could see our route up the glacier past the difficult Caca Aca and beyond in the distance the opaque green of the lake on Zongo Pass. To the north were Condoriri (19,420 ft.), Illampu (20,830 ft.) and other giants among the wild, partly unknown sea of peaks constituting the wider portion of the Cordillera Real. Adjacent to this on

the west, out beyond the summit cornice, lay the barren but now luminous-appearing bowl of the Altiplano, with Lake Titicaca shining in the distance.

Reluctantly we turned to the descent and bypassed the long upward route to start cautiously but directly down the steeper ice of the southeast side, which fell without relief and seemed to bulge out over the gaping bergschrund 1300 feet below. Near the top the ice was hard and *penitentes* almost lacking, but with 12-point crampons it was just possible to manage without cutting more than an occasional step except for belay positions. Forty minutes later we jumped the bergschrund and sat down to despatch a can of peaches before taking the long slopes and ice wall still between us and the tent. By 4.30 we were back, having made the ninth ascent of Huayna. Hector had made his third!

THE HISTORIC HUTS OF THE ANTARCTIC

by BRADFORD F. SWAN

ANTARCTICA IS A CRUEL and destructive continent but it has been kind to the huts built there by the early explorers, Borchgrevink, Scott and Shackleton. Either that, or these explorers built well, for today the first structure erected for human habitation on the Antarctic continent is still standing and was used only this season as a shelter by two scientists, although it is now more than sixty years old. And two of the three huts used by Scott and Shackleton at Hut Point, Cape Evans and Cape Royds, on the western shore of Ross Island, facing McMurdo Sound, have been cleaned out and put in order during the past year by a team of New Zealanders.

When one visits the United States base at McMurdo as a press correspondent one is given a mimeographed, bound pamphlet entitled *Historic Huts*. This, which must be the first publication printed specifically for distribution in the Antarctic since Scott's men produced the continuation of the *South Polar Times* in 1911-13, was prepared by L. B. Quartermain, Information Officer, Antarctic Division, D.S.I.R., Wellington, N.Z. Its introduction is worth reprinting here:

You are privileged to visit the old huts in McMurdo Sound where great men of the "Heroic Age" of Antarctic exploration once lived. As you enter these huts, please remember that you are on historic ground and pay the reverence due to the memory of those who toiled, suffered and, some of them, died to unlock the secrets of the Great White South.

It is desired that these huts should be preserved as nearly as possible in their original condition, as lasting memorials of these pioneer explorers of the Antarctic. We need hardly remind you, then, that any defacement of these memorials, or any pilfering of "souvenirs" from them, would be gross vandalism.

It is both a tribute to the sort of people we are sending to the Antarctic and evidence of the veneration in which they hold their forerunners that this forthright request is strictly observed. One sees all sorts of fascinating objects lying about the ground outside the huts, and Shackleton's hut at Cape Royds contains a

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Mr. Swan wishes to extend to the personnel, both officers and men, of the U.S. Naval Support Force, Antarctica, his thanks for permission to use the Navy's photographs of the historic huts at McMurdo Sound, and to acknowledge the valuable services of the Navy's public information officers and chief journalists in providing him with factual data,

vast supply of canned goods, doubtless still edible, and his expedition's library. These are a sore temptation to the souvenir-hunter. Will one can of kippered herring be missed from that pile alongside the Cape Royds hut, which looks as though it



had been dumped there by a coal-truck? But one succumbs, not to temptation but rather to the air of sanctity, and keeps one's hands in one's pockets.

Of these four huts—at Cape Adare, Cape Royds, Cape Evans and Hut Point—the one which seemed to me the holiest ground is the so-called *Discovery* hut at Hut Point. This lies on what is now the northern fringe of the Navy's McMurdo base, a walk

of perhaps a quarter-mile from the "center of town" over a nearly level roadway fringing the shore. Silhouetted on the black ridge of kenyte gravel behind it is Vince's Cross, erected in memory of George Vince, a British seaman who lost his way in a blizzard and slid down Danger Slope, on the north side of Hut Point, into the open waters of the Sound. Below the hut and held fast in the sea-ice near the shore of the point is a YOG, one of the Navy's gasoline tankers. It was purposely run into shallow water here and allowed to freeze in, so that it could be used as a gasoline-storage tank. Up on a level place in the ridge behind the hut there is a flat-topped, blaze-orange, gasoline-storage tank, put there to supplant the YOG, which was beginning to be crushed by the ice.

Thus crowded by manifestations of a more modern existence, with all the comforts that progress implies, the hut has lost none of its dignity. Constantly visible across the little cove that lies between it and the McMurdo base, it sits there as a constant reminder that giants once trod this ground and great men lived here.

Although the hut was never used as a dwelling by the men of the *Discovery* expedition under Captain Robert Falcon Scott, by whom it was built in 1902, it is a shrine that abounds with great memories. The *Discovery* men lived on their ship of that name, frozen into the ice about 200 yards off shore, and used the hut as a safe repository for emergency supplies, in case the ship was damaged by ice, and for certain scientific work.¹ But after this first Scott expedition the hut really came into its own as a useful shelter, and three subsequent expeditions made it their jumping-off place on historic journeys to the south. Never a comfortable place, it still can claim credit for saving the lives of dozens of explorers who were forced to use it.

From it Shackleton started on his historic push southward to within less than a hundred miles of the South Pole in 1908-09, the great journey on which the route up to the Polar Plateau via the Beardmore Glacier was discovered. And from it Scott and his comrades departed on their 1912 sledge journey to the South Pole, a tragic endeavor during which all five men who had reached the Pole perished on the return trip.

But, though these two expeditions alone would make this hut hallowed ground, its greatest usefulness was as an emergency shelter for parties returning from southern journeys out onto the Ross Ice Shelf who found themselves cut off from their

¹ By a queer coincidence this building can also be called the first theater in the Antarctic, for Scott's men rehearsed their amateur shows there. It provided privacy not available on the ship for the preparation of skits lampooning members of the expedition, which had to be worked out in secrecy in order to be a surprise.

comfortable bases farther north by open water in McMurdo Sound. Unless the Sound is frozen over, there is no way for foot travelers to get from Hut Point to Cape Evans or Cape Royds. The great western slopes of Mt. Erebus look like traversable snowfields from out on the sea-ice of the Sound, but actually the whole area is wickedly crevassed by glaciers which terminate at the water's edge in ice-cliffs several hundred feet high and no party hauling sledges can cross it in safety.

Scott had made his depot journey southward in the early months of 1911, caching supplies for the Polar party to use the following November, and when he returned to Hut Point he found his access to his main base at Cape Evans cut off until the sea froze over. Consequently he and a group of his men had to stay in the *Discovery* hut for a matter of six weeks, living most of the time on what seals they could kill.

The *Discovery* hut was the base from which Apsley Cherry-Garrard and the Russian dog-driver, Dimitri, started on their search journey out as far as One-Ton Depot, 150 miles to the south, when Scott failed to return, and here the men of his expedition waited in vain for Scott to come back from the Pole.

In October 1915 the old *Discovery* hut again saw service in an emergency. The western party of Shackleton's 1914-17 expedition was charged with laying food and fuel depots southward from McMurdo Sound so that Shackleton could use them when he came northward from the Pole after crossing the continent from the Weddell Sea. Shackleton's ship, the *Endurance*, was caught in the ice and he never even set foot on the far side of the Antarctic continent, but the western party, led by Captain Mackintosh of the *Aurora*, had no way of knowing this. Their duty was to lay the depots and this they undertook to do, although a blizzard had blown the *Aurora* out to sea and left them stranded at Cape Evans with hardly any supplies or equipment.

They had made their first depot journey, down to 80°S., in the first months of 1915 and once again a returning party was forced to hole up at Hut Point for nine weeks until the Sound froze sufficiently for them to get back to Cape Evans. There they learned of what had happened to the *Aurora*. Somehow they managed to survive the winter in Scott's old Cape Evans hut by using supplies Scott's men had left there and by raiding the foodstuffs left behind by the earlier Shackleton expedition at Cape Royds.

The next October they were off on a depot journey as far as Minna Bluff and in December, using the old *Discovery* hut as a base, they made a truly heroic trek as far south as Mt. Hope, at the foot of the Beardmore Glacier, where they established their southernmost depot. On the return one man, Spencer-Smith, died, but the other eight reached Hut Point about the middle of



SCOTT'S HUT AT CAPE EVANS

Official U.S. Navy Photographs





Bradford F. Swan

THE DISCOVERY HUT AT HUT POINT

SHACKLETON'S HUT AT CAPE ROYDS

Official U.S. Navy Photograph



March and found shelter there until the middle of May, when they had recovered from scurvy and the sea-ice was thought strong enough for the return march to Cape Evans. Mackintosh and another man, Hayward, started north on May 8 and were never seen again. Presumably the sea-ice broke under them, and it wasn't until July 15 that the six survivors at Hut Point were able to march the 15 miles to Cape Evans. At Cape Evans there is a cross in memory of the three who died, and atop Observation Hill, just south of the McMurdo base and overlooking the *Discovery* hut, there is a cross to commemorate Scott and his four companions who perished on their way back from the Pole.

Another memorial, and the only marked grave in the Antarctic, is up on the top of Cape Adare, perhaps a thousand feet above the hut where C. E. Borchgrevink and a party of ten men spent the winter of 1899, the first men ever to winter-over on the Antarctic continent. The grave is that of Nicolai Hanson, a scientist who died of natural causes during the winter. He asked to be buried on the top of the prominent cape.

The hut on the beach below was reported this season to be in good shape. Two scientists, Brian Reid of Rotorua, N.Z., and Colin Bailey of Adelaide, Australia, making studies at the Adelie penguin rookery there, decided to use the hut rather than their tent, which had been damaged by windblown stones. They found it partly filled with hardpacked snow and ice, but were able to dig this out and use the building. They found numerous vestiges of the Borchgrevink expedition, including old magazines and scientific journals, glass photographic plates, tins of chocolates, cans of food, and matches.

Two huts built by the northern party of Scott's last expedition at Cape Adare have fallen in ruins and it is not known what will be done about trying to restore them. The New Zealand historic huts team, working under the direction of Leslie Quartermain, concentrated their efforts this past season on the huts at Cape Royds and Cape Evans. In their restoration of the Cape Evans hut they had some valuable help and advice from Sir Charles Wright, a Canadian scientist who was a member of Scott's last expedition and returned to the Antarctic this season to do research in geo-magnetism. He was the youngest member of Scott's party, but even so it is a bit strange to realize that Antarctic history is so brief that the man for whom the Wright Glacier was named, a man who walked to the top of the Beardmore glacier and back, was able to return to the places where he had worked and explored and to give his recollections in person of what the huts were like in his day.

I was able to visit two of the historic huts during a twelve-day visit to Antarctica last October and November. On the afternoon of October 31, which was extraordinarily mild, with a tempera-

ture of 24°F. and bright sun, I went to the *Discovery* hut at Hut Point. I quote from my diary:

After lunch a party was formed to walk over to the *Discovery* hut, which is holy ground for me. The place is a sad mess, with Spratt's dog biscuit all about, old sealskins, skeletons, penguin flippers, and other assorted debris. The out-buildings behind the hut have blown down and the hut itself is filled with ice. One corner has collapsed. There is still straw bedding for the ponies in the veranda and all sorts of vivid evidence of the place's historic significance.

Getting the ice out of the hut will be a problem; they do not want to use ice-axes as this will disturb the contents. Rather, they plan to use heaters and melt out the ice, so that they can see where things are when the ice disappears.

After poking around the hut we climbed up to Vince's Cross at the tip of Hut Point. This is a remarkable memorial to a British seaman who died on Scott's first expedition, nearly sixty years ago, and it is perfectly preserved. It is made of Australian jara wood and is appropriately inscribed. Then we took the steep climb through loose volcanic kenyte scree up to Our Lady of the Snows shrine, erected in memory of Richard Williams, a Navy tractor-driver who went through the ice with his vehicle during the first Operation Deep Freeze.

The other historic hut which I was able to visit was the one at Cape Royds, some 25 miles to the north. I flew there by Navy helicopter on November 8, my last day at McMurdo. I quote again from my diary:

Lieutenant Commander Helms set us down on a frozen pool about midway between Shackleton's hut and the penguin rookery. The rookery really stank. It isn't very big—maybe a couple of thousand birds, all Adelies—and they were just finishing their courting. The nests of pebbles had been built and they were dancing around and singing to one another, but no eggs were in evidence and, of course, no chicks. The place is paved with guano and feathers, with here and there the flattened body of a chick left from some previous year. (This seems to confirm the observation by Ponting that those unpleasant scavengers, the skua gulls, never touch the bodies of dead birds, preferring to eat the chicks alive.)

We went over to the hut, which was in a good state of repair (only one small drift of snow inside), and after poking about a little went in to look around. It is fantastic to see the canned goods stacked around the sides in open boxes arranged like shelves. Of course souvenir-hunting is forbidden and this rule seems to be well respected, so that the past is well preserved. Not such a good effort has been made, however, to avoid making "additions" and in several places one finds jars of Pream, a paperback Western among the books, and similar anachronisms, all left by the Kiwi penguin-study parties who have been camping in the hut in recent seasons.

Outside, against the wall of the hut, there is an immense pile of cans, unopened, of kippered herring. These are a little rusted but some of them still bear the labels. There is also a pile of nails on the ground, just as though a keg of them had been dumped there when the hut was building. On a little knoll nearby is a meteorological screen, a relic of Shackleton's day, I believe.

We went home in a direct line, far west of Cape Evans, but I

could see Scott's hut there because I knew exactly where to look for it. Behind it lay the Ramp, about which I had read so often. The sun's rays on the ice-cliffs and the tumbling ice-falls of the magnificent Barne Glacier made this view particularly spectacular. Old Erebus was flying quite a plume of steam. The Turk's Head stood up sharply and the Glacier Tongue was especially beautiful in the late afternoon sunlight. You could see how it curves down from the southwest slope of Erebus, turns, and flows out into the Sound, but what amazed me most were the V-shaped teeth or indentations on its south edge. These are remarkably regular, as though they represented the annual "shove" of the glacier.

Everything else was there to be seen—Inaccessible Island, Tent Island, Big and Little Razorback Islands, Turtle Rock, Castle Rock, Crater Hill, Arrival Heights, Hut Point, the Gap, and finally, at the end of the land, Observation Hill. We swung over them all, while the photographer did some aerial mapping. We circled away out over the Barrier beyond Cape Armitage, and finally dropped down to the helicopter platform on the shoulder of Observation Hill.

Several weeks later, back in Providence, I received a news despatch from the Navy telling of the work of Mr. Quartermain's team. They had gone up to Cape Royds, which was being used again during the Antarctic summer by scientists studying the penguins, and had put this hut into good shape. About all it needed was a sweeping-out and some canvas on the roof to stop snow leaks. Then Mr. Quartermain and his four volunteer helpers, all members of the New Zealand Antarctic Society, moved down to Cape Evans.

The hut there was badly filled with snow and ice and they had to hack away at it for days before they got it reasonably clear. The interior, however, is much the same as it was in Scott's day, despite its use by Mackintosh and his party. Antarctic visitors in recent years have not been encouraged to visit Cape Evans, partly because there was no attraction there except the hut, which could not be entered because of the ice inside, and partly because of the desire to keep the place intact until it could be set in order by the historic huts team. It was visited briefly by U.S. Navy personnel in 1947, during Operation High-jump, but has been left untouched ever since. Now a bronze tablet has been attached to an outer wall. This reads: "The British Antarctic Expedition 1910-13 Under Captain Scott Built This Hut. The Ross Sea Party of Shackleton's Expedition 1914-17 Also Lived Here."

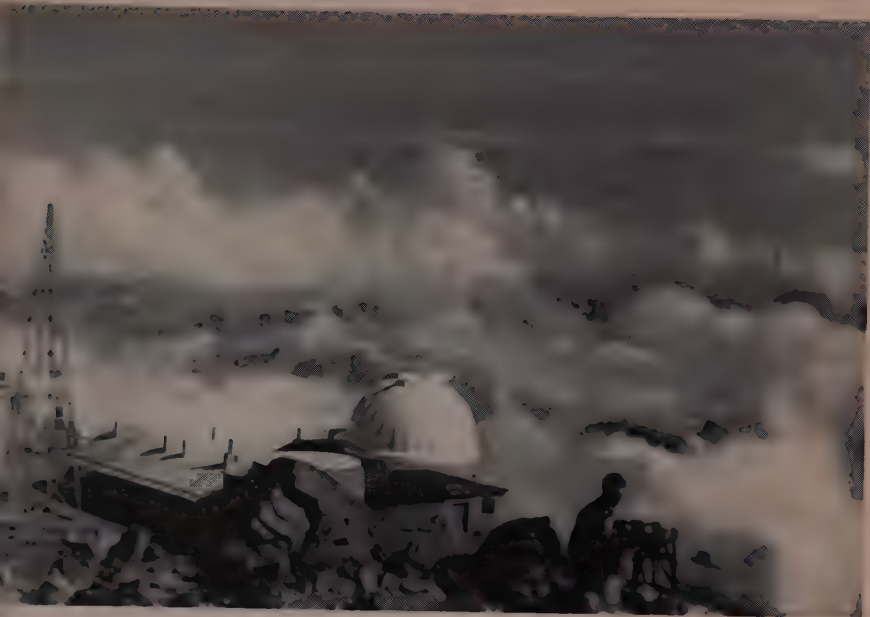
There are two other shelters in the Ross Sea area of the Antarctic which I wish I could have visited. One is the stone hut which Dr. Wilson, "Birdie" Bowers and Cherry-Garrard built on The Knoll above Cape Crozier when they made their famous winter journey there to collect Emperor penguin eggs in the depth of the Antarctic night. Shortly after my arrival in Antarctica I requested a chance to visit Cape Crozier. I wanted to see

this strange shelter where, after the roof made of canvas had blown away, the three men lay in their sleeping-bags for two days while the blizzard raged. Sir Edmund Hillary had visited The Knoll during his first season at Pram Point, when he wanted to try out his Ferguson tractors on the Ross Ice Shelf, and had succeeded in finding this hut. The sledge that formed the roof was still there, "still in excellent condition", and digging into the icy drift Hillary found many relics, "some of Wilson's drawing pencils, test tubes, thermometers, unexposed film, a blubber stove, a heavy pick-axe, and the skins and blubber from Emperor penguins".

But the Navy thought Cape Crozier was too dangerous a place for a visit that was no more than a sentimental journey. After all, even if the helicopter was able to find a safe spot for a landing, the chances of getting into trouble at Cape Crozier were great, and with the dreadful pressure ridges in the ice near the Cape any rescue effort would be both difficult and hazardous.

I should also have liked to hunt for the stone hut Griffiths Taylor and three other men of Scott's last expedition built near Discovery Bluff in Granite Harbor, on the western side of McMurdo Sound. This was their home while they explored the area and the base for their trip into the interior via the Mackay Glacier. So far as I know, no one has visited this hut since Taylor's party left it in 1912.

The historic huts of the Ross Sea area are indeed sacred ground, and one cannot visit them without recalling the fact that they were the homes of heroes, the like of which the Antarctic will never see again. The Great White South will continue to have its heroes—men perform brave deeds down there every day, even now—but these places sheltered the pioneers; they were the first homes of the brave.



PIC DU MIDI OBSERVATORY, FRENCH PYRENEES

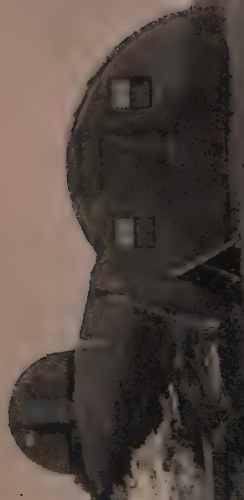
Elevation approx. 9300 feet



SUMMIT LABORATORY, MOUNT EVANS, COLORADO

Elevation 14,156 feet

Byron Cohn



THE MOUNT WRANGELL COSMIC RAY STATION IN ALASKA

Serge A. Korff

HIGH SCIENCE

by WELDON F. HEALD

LUCKY IS HE—or she—who's life-work is a science that takes him—or her—to the mountains. For within recent years there has been built a chain of high-altitude laboratories that rings the globe. They are located upon snowy mountaintops, beside vast glaciers, among alpine forests, and on the tips of desert peaks. Most of them would stimulate the climbing glands of a true mountaineer and they enable scientists on their days off to explore many of the world's loftiest ranges.

These high-altitude laboratories have been established by universities and foundations for the advancement of science along many fronts. They provide research facilities in the various fields of physics, astronomy, medicine, biology, botany, meteorology, geology and anything else an imaginative scientist can dream up. The stations vary greatly in size and equipment, and some are specialized for a particular study. But all have accommodations for researchers at very low rates and provide basic needs, such as bunks, stoves, working space and electric power. What more could a mountain-minded scientist ask for?

The man who knows all about these high-perched technical workshops is Dr. Serge A. Korff. In an article in *Time* or *Newsweek*—I forget which—he was called "the Duncan Hines of High Altitude Laboratories". Head of the Department of Physics at New York University, his specialty is cosmic rays, which he has pursued in both hemispheres. He is also an internationally known scientific ambassador of goodwill, with a travel record equal to a Dulles or an Eleanor Roosevelt. I've been acquainted with Serge for many years and can never guess where his next letter or postcard will come from—Cuzco, Mozambique, Pago Pago or Port Moresby.

On his globe-girdling peregrinations he has made a point of visiting as many mountain laboratories as possible and gathering material about them. This resulted in his editing a "guidebook" entitled *The World's High Altitude Research Stations*, which was published in 1954. It is a compilation listing and describing the facilities of forty-four laboratories in thirteen countries. The book also includes photographs of fifteen of them.

Arbitrarily, only those stations above 7500 feet elevation are listed. Of course, many South American cities exceed that altitude, and there are scores of easily accessible high passes and

WELDON F. HEALD, a member of the Club living in Arizona, is a frequent contributor to APPALACHIA. He has a wide knowledge of the mountain regions of the world.

mountains in several countries where field work and research can be done without a permanent set-up. Also, 6288-foot Mt. Washington is automatically excluded from the exalted roster. Yet New England's highest point has been America's busiest and most overworked mountaintop scientific station since 1870. Furthermore, questionnaires addressed to known stations behind the Iron Curtain remained unanswered. But, in general, the information is remarkably thorough and inclusive.

Thumbing through Serge Korff's guidebook is a stimulating pastime for an imaginative mountain enthusiast. The stations range from cosmic ray tentsites 15,000 feet up in the Chilean Andes to super-civilized accommodations for nearly fifty workers at Switzerland's Jungfraujoch. The latter, located 11,350 feet above sea-level and reached by mountain railway, is the finest and perhaps the best equipped high-altitude laboratory in the world. The Alps also have two others above 11,000 feet and many more at lower altitudes. Altogether, Switzerland, Italy, Germany and Austria maintain eleven alpine stations; the largest and best known in France is the observatory atop the 9370-foot Pic du Midi in the Pyrenees.

After Europe, North America takes second place, with twelve mountain laboratories. Farthest north is the Mt. Wrangell Observatory in Alaska. It is a cosmic ray station sponsored by New York University and Serge himself had a leading part in establishing it. There isn't much question that he found the most remote, arctic and inaccessible spot on which to put a laboratory. Located at an altitude of 14,000 feet, the station consists of two Jamesway huts on the crater rim of this gigantic northern volcano. Although the huge dormant crater, two miles in diameter, is filled with ice, a half-mile south is a small, still active cone. The station is open from May to September inclusive, and there are accommodations for four scientists. Maximum temperatures during the summer months may rise to 30° Fahrenheit, but on snappy nights the thermometer plunges to zero, and the average snow depth is about six feet.

But the most unusual feature of the Mt. Wrangell Observatory is that it is reached only by air. The mountain has been climbed but twice on foot, and the arduous ascent takes days of slogging over ice and snow. However, by ski-plane the station is an hour's easy flight from Copper Center, on the paved Richardson Highway. Scientists staying in this lonesome, inhospitable sky-niche are provisioned by air-drop.

Quite different are the two stations perched on Hawaiian volcanoes, high above the blue Pacific. That on the summit of Mauna Loa, 13,453 feet elevation, is simply a hut with practically no facilities, and it is reached by four-wheel-drive vehicles. But

the cosmic ray observatory on the crater edge of Haleakala, 10,025 feet altitude, is at the end of a paved road and has a 220-volt power line, as well as sleeping and eating accommodations. It is interesting to note that the rooftops of these "Isles of Perpetual Summer" are a bit chilly. I visited both stations several years ago and felt the cold, damp wind right through to my bone marrow. At the former we waded through wet snow a foot deep.

In the Far Western United States are nine high-altitude workshops, mostly situated amidst delectable mountain surroundings. Perhaps best known is the laboratory just below the summit of Colorado's 14,260-foot Mt. Evans. It is connected with the world below by the nation's highest paved automobile highway, and is conducted by the University of Colorado in collaboration with five other universities. The dormitory accommodates six, and twenty more can stay at Echo Lake Laboratory, under the same auspices, fourteen miles down the road. The latter has a scenic site in a fine spruce forest at an elevation of 10,700 feet, and the combination of the two stations is ideal for a work-vacation sojourn at about \$2.00 per day. In fact, it is "Colorful Colorado" at its best.

There is also a sizable, well-equipped laboratory, 11,190 feet altitude, at Climax, 60 miles southwest, and two mountaintop stations in New Mexico, both over 9000 feet elevation. Farther west, in California, is the ambitious White Mountain Research Station. This consists of two units, 10,640 feet and 12,480 feet high, on top of the White Mountains in the eastern part of the state, near the Nevada line. The laboratories, ten miles apart, are sponsored by the Navy, and by the Rockefeller and Natural Science foundations. Reached by dirt road, they are open all year and some thirty-five workers can live there at one time, while the facilities are ample for research in many fields. Nearby is a grove of bristlecone pines which were discovered to be the oldest living things on earth.

Most Western high-altitude stations are comparatively new, and mountaintop research is now much easier than it used to be. Some years ago Serge Korff and I hauled an 80-pound double Geiger counter up Arizona's San Francisco Peaks to bag cosmic rays. Our "station" was a tumbledown cabin on Doyle Saddle, 11,250 feet, and I believe at that time it was the highest point where cosmic ray observations had been made. But a combination of torrential thunderstorms and a leaky roof drove us down in three days. Later, Serge beat our record by reoccupying the ruins of the old Harvard observatory on the volcano El Misti in Peru. Although abandoned many years ago, this laboratory at 19,200 feet still retains top honors as being the highest scientific station ever established. (*Continued on page 339*)

THE SHAPE OF NEW ENGLAND MOUNTAINS

by WILL F. THOMPSON

PART II

Introduction

ANALYSIS OF THE EFFECT of past and present climate on the form and surface texture of New England mountains, as exemplified by the Presidential Range in New Hampshire and by Katahdin in Maine, has been undertaken as a means of entry into a challenging but still rather unorganized field, the regional physical geography of mountains. The context and objectives of the study have been discussed in Part I. Reference to the illustrations in Part I will also be helpful to readers of this section.

The current section, Part II, deals with those areas of the New England alpine and subalpine zone which, though somewhat affected by continental glaciation of the region, have not been modified by local glaciers. Local glaciers have been an important means by which climate has made its mark on the New England mountain landscape, but are secondary in that respect to mass wasting (movement of detritus without benefit of a suspending medium such as wind, a stream, or glacial ice). Discussion of the now vanished local glaciers of Katahdin and the Presidentials, their cirques and morainal deposits of various kinds, and past and present geomorphic processes associated with them will therefore be deferred to Part III.

Understanding of alpine and subalpine geomorphic processes in New England is sought as a basis for comparison with the regionally distinctive climate-sensitive geomorphic processes of other mountains throughout the world. The discussion will therefore be quite general, based on study and interpretation of nearly 700 aerial oblique and ground photographs covering all parts of the Presidentials and Katahdin,¹ as well as on study of the literature and on field observations throughout both ranges (Thompson 1960). Nevertheless, it seems best to confine present

Part I of this article appeared in APPALACHIA for December 1960.

¹ Because of recent improvement in film, the photographic coverage on which interpretation was largely based was more adequate and economical than has been the case with most studies of this type. The photographs were taken on the ground and from light planes with a Leica IIIf camera, Summicron f2 lens, on Plus X film exposed at an ASA index of 200 and processed according to instructions. Initial interpretation was done from positive contact transparencies made on high-contrast orthochromatic sheet film (8x10 inches), studied over a light table with a good hand-lens having about 8X magnification.

The very fine detail obtained on the negatives was thus fully available without enlargement, though selected pictures were subsequently enlarged. Illustrations presented here are representative of the coverage used.

landscape references as far as possible to a transect across the summit of Mt. Washington, highest of the Presidentials, illustrated by Figures 1 and 2. Figure 2, in particular, should be placed in context by comparing it with Figures 1 and 2 in Part I. However broad the discussion may become, frequent reference should be made to the illustrations. The discussion will begin and end with a consideration of conditions below timberline on opposite sides of the mountain, following the illustrated transect from windward to leeward (west to east) with respect to the powerful prevailing winds of the New England alpine zone. Landscape references in Part III will be much less restricted, since the effects of local glaciers vary greatly in different localities on the Presidentials and Katahdin.

Start of the Transect: A Stream-Cut Subalpine Gorge

Figure 1 shows the windward slopes of Mt. Washington from its 6288-foot summit down to the 3000-foot level in Burt Ravine, two miles west. Timberline is visible in the picture as a transition zone, between the 4500 and 5000-foot levels, in which the subalpine forest is first reduced to scattered masses of matted coniferous scrub (*krummholz*) and then disappears. The upper slopes of the mountain are thus divided into an alpine and a subalpine zone, the alpine part being free of trees and the subalpine part forested. In sheltered depressions such as Burt Ravine the New England timberline lies higher than on adjacent windswept ridges. Except in avalanche-swept cirques such as Tuckerman Ravine it thus reverses a topographic relationship normal in snowier and less windy ranges.

Clay Brook, a boulder-filled torrent, so called only because the slopes to the north of it are part of Mt. Clay, is the dominant subalpine erosive agent in Burt Ravine and the cause of its steepness, but its effect is modified by mass-wasting processes active on its watershed. Because all drainage passing through the ravine, and therefore much of the energy available to do geomorphic² work within it, becomes concentrated in the brook, the channel is sharply notched into its floor and its walls are very steep. Nevertheless, the ravine walls are graded slopes, curving smoothly upward almost without regard for those differences in resistance to weathering which presumably exist in the rocks they bevel. This is not a local, accidental condition but is entirely typical of the walls of stream-cut subalpine ravines in New England mountains. (See Fig. 3 of Part I, showing Ammonoosuc Ravine, an exceptionally well-developed stream-cut subalpine gorge in the Presidentials.)

² Geomorphology is the study of the effect of various processes of weathering and erosion on topographic form.

Felsenmeer creep and landsliding, two forms of mass wasting, have acted together to grade the slopes of Burt Ravine. The surfaces which form barren lanes, mantled by open-jointed, superficially soil-free boulders (felsenmeer), among the scrub patches at timberline in Figure 1 are shaped primarily by felsenmeer creep, a process mentioned in Part I and further discussed below. The same process is active, though less powerful than above timberline, down to the banks of Clay Brook under the krummholz and subalpine forest. Under either forest or scrub, active frost heave is indicated by the fact that crevices among the felsenmeer boulders remain open-jointed at a slight depth, though the surface of such wooded boulderfields is partly covered with organic soil and duff. Frost heave deep under the boulderfield heaves the boulders up out of a mass of silty, stony, frost-stirred mineral soil (congeliturbate) which accumulates around their bases, and also causes the surface boulders to shoulder aside the superficial forest soil somewhat each winter, leaving gaps around the stones an inch or two wide which connect with the system of open crevices below. Connection between its crevices and the open air is essential to the character of a felsenmeer.

Throughout New England mountains forested subalpine felsenmeers tend to thicken as time passes, especially on concave slopes, partly because of persistent riving and upheaval of boulders from underlying bedrock by frost, and partly because the power of frost increases upslope, so that bouldery detritus creeps onto such a slope faster than it creeps away downhill. Great numbers of subalpine slopes in New England occasionally landslide after heavy rains because they become overloaded in this way.

Three fresh landslide tracks scar the left (north) wall of Burt Ravine as shown in Figure 1. Fainter scars elsewhere on the ravine wall indicate older slides nearly healed by the formation of new soil and vegetation and by the convergence of adjacent soil masses (felsenmeer creep). The revegetation of such scars was studied by Flaccus in 1959. The frequency of such landslides and the relatively rapid rate at which their scars are known to heal are in keeping with the vigor of alpine and subalpine geomorphic processes in the mountains of this region.

Though Clay Brook is a vigorous stream, it is not equal to the task of carrying off immediately the debris of even a minor landslide. In its upper reaches, shown in Figure 1, its bedrock channel is thus protected from erosion most of the time by very coarse detritus and consequently remains quite steep. Incipient tributary channels within the ravine are so vigorously filled by creep and by landslides that they are hardly intrenched in bedrock at all. Dissection of the alpine slopes above by stream-cut gorges is therefore delayed, mass wasting being a force consistently opposed to channel cutting by streams.

The Alpine Zone: Perennial Frost

The Presidential alpine zone and that of Katahdin differ from the subalpine zone below them because they are strongly dominated by mass wasting, whereas erosion by streams and local glaciers, agencies dependent for their effectiveness on concentration of drainage, has largely determined the form of the subalpine slopes. Because drainage does become concentrated in channels at subalpine levels in New England, that zone is one of many steep-walled gorges. On the other hand, alpine mass wasting disperses drainage above timberline and thus inhibits dissection at that level. Because it exerts its wasting effect over the whole surface instead of within channels, it reduces gradients on the uplands, thus causing a topographic contrast between alpine slopes above timberline and the steep subalpine slopes which often lie immediately downslope from them. The vigor of alpine mass wasting, and the manner in which it acts, are due to especially powerful frost on the alpine zone.

Ernst Antevs and R. P. Goldthwait, whose basic work on the Presidentials was discussed in Part I, were inclined to minimize the extent of permafrost (perennial soil frost) in the New England alpine zone. Antevs found it hard to estimate the present importance of frost on the Presidentials but said that permafrost might be expected "wherever shadow is persistent or the surface layer poorly conductive." He clearly did not consider it a universal condition even in the alpine zone.

Part I of this study has explained that, within the crevices of felsenmeers such as cover most of the New England alpine uplands, warmth accumulated in summer sets up during the winter a convective circulation of air (Balch ventilation). On clear winter nights, in particular, relatively warm air rising out of the crevices is replaced by air which is extremely cold because it has just been lying on the immediate surface of the strongly radiating mountainside. On the other hand, there can be very little ventilation of such cavities in summer because their air, underfoot among the deeply chilled rocks, remains cooler and hence heavier than that above the surface. Felsenmeers in severe climates thus create a bias in favor of outward flow of heat and consequently have sub-surface temperatures considerably below the mean annual temperature of the overlying air.

The mean annual air temperature on the summit of Mt. Washington is 27°F.; July and January means are 49.3°F. and 5.4°F., respectively. Interpolation between the summit and lower climatic stations indicates a mean annual air temperature at timberline which is very close to freezing. Such interpolation makes no allowance for special conditions on particular slopes. Even without Balch ventilation, discontinuous permafrost at least, such

as Antevs considered likely, would thus be expected on the Presidential alpine uplands. Actually, we know from well-drillers' records cited in Part I that freezing temperatures extend downward into bedrock for 300 feet on the summit of the mountain. About 200 feet of permafrost are said to have been encountered in another well beneath the Air Force jet engine icing laboratory shown on the left skyline of Figure 1. Such depths of permafrost compare with those of many arctic and subarctic regions. The 44°F. range of monthly mean temperatures at the summit is somewhat less than that which prevails in the nearby lowlands but is probably fairly representative for the New England alpine zone. It implies strong thawing and refreezing of the surface each season.

Antevs cited permafrost observed by Joseph B. Dodge in the foundation excavations of the two Appalachian Mountain Club huts which are located at timberline on the Presidentials. The King Ravine rock glacier in the Presidentials, which lies deep in a north-facing glacial cirque, has long been known to retain ice in accessible crevices throughout the year at an altitude of about 3800 feet, roughly 1000 feet below timberline. Even at 3000 feet there is probably perennial ice deep within the snout of the rock glacier in crevices not penetrated by summer radiation. Similar conditions seem to prevail in appropriate places on Katahdin. Permafrost thus seems to be present in New England throughout the alpine zone and much of the subalpine zone, reaching its lowest levels on shadowed boulder slopes. Annual and shorter-period soil frost are also important, not only on the lower slopes of the range but throughout New England.

The contrast between the vigor of soil frost on alpine and subalpine slopes in New England is too great to be considered due entirely to altitude. Enormously violent winter winds sweep away much of the alpine snow cover, so that winter ventilation of felsenmeer above timberline is very thorough. (Brooks, 1940, cited 709 hours of wind over 100 m.p.h. on the summit of Mt. Washington in the period 1932-1939, mostly in winter.) Subalpine snow cover, though fairly deep, is too permeable to retain the relatively warm air generated among the boulders it covers, but it does inhibit Balch ventilation by slowing the inflow of cold surface air and moderating the temperature of air which filters through its pores to match that of the snow mass at the moment. Frost action beneath subalpine boulders is thus so much reduced that many subalpine gorge walls, though undercut and greatly steepened by streams and local glaciers, retain seemingly stable felsenmeer at gradients almost unknown in the alpine zone. Special phenomena which occur on the few steep alpine felsenmeers are discussed later in connection with Figure 2.

Felsenmeer Structure and Motion

If it were not for Balch ventilation, which carries frost down into silty underlying soil subject to frost disturbance, New England felsenmeers would have to be considered the stable "fossil" structures, proof against present-day frost, which Antevs believed them to be. Felsenmeer joints are usually well drained, so that little ice forms within them. Such ice as does form is of little geomorphic importance. Taber (1929) showed that frost heave develops significant amplitude only when the frost occurs within silts and clays. Even coarse, clean sand is too open-textured to permit the capillary movement of supercooled water necessary for the growth of Taber's segregated masses of ice crystals, which do so much geomorphic work at high latitudes and altitudes (Jackson and Chalmers, 1958).

Growth of such masses very much overshadows simple freezing as a cause of frost heave in soil, yet they cannot develop even in water-filled felsenmeer crevices. The expansion of ground water on simple freezing is so modest that its powerful thrust is usually entirely relieved by a relatively slight lifting of the overlying surface. Simple freezing becomes important only within the crevices of bedrock, where even minor lifting of the overlying mass requires great force and causes riving.

Fine-textured soil occurs only locally on the surface on the higher parts of the Presidentials and Katahdin, except as the discontinuous superficial accumulation mentioned below, but it does occur throughout the two ranges as a component of a stony congeliturbate beneath felsenmeer. Formation of segregated ice masses within it, because of Balch ventilation, heaves up the whole overlying surface. Thaw subsequently makes semifluid much of the fine earth around boulders in such soil, even though ice masses remain unmelted beneath them for some time. Frost heave of boulders relative to the soil around them occurs because, as the underlying ice melts slowly from the sides of the boulders toward their centers, mud carrying small fragments of rock flows down into the cavity so that the upheaved boulder cannot settle completely back into place. Rain and thaw water wash down to the lower part of the soil mass any silt, clay or small stones which cling to the upheaved boulder. Particles weathered from the boulders also sift down, as years pass, to add to the volume of congeliturbate. The soil thus becomes divided into at least two zones, visible in many cross-sections through felsenmeer: open-jointed, clean, weathered boulders (felsenmeer) above, and stony, silty, frost-stirred soil (congeliturbate) below. Many alpine slopes resemble forested felsenmeer in having a third zone composed of superficial soil, discontinuous and mostly organic, lying among their uppermost boulders.

Because of Balch ventilation, masses of segregated ice continue

to form within the congeliturbate zone winter after winter. Each freeze heaves the whole mass of soil and boulders away from the slope; each summer's thaw drops it down the slope a short distance. This is the basic process of soil creep in middle and high latitudes even in the absence of felsenmeer, but the burden of boulders carried by felsenmeer creep adds greatly to its wasting power. However much the congeliturbate zone is churned by frost, and however many new boulders riven from bedrock are heaved up through it to become part of the felsenmeer, the disturbance is at the bottom rather than the top of the boulder layer. On moderate and fairly regular felsenmeer slopes surface boulders are thus seldom abruptly overturned or displaced relative to one another.

Lichen cover can thus become general on most felsenmeer surfaces free of superficial soil, as the Goldthwaits noted (J. W. Goldthwait, 1914; R. P. Goldthwait, 1939, 1940). Cairns and dry-stone walls have remained standing on the Presidential felsenmeer for more than half a century. Such apparent stability of the felsenmeer surface should not be mistaken for inertness, however, since it masks powerful slow movements generated below the surface. Figure 2 shows alpine felsenmeer (on the light-toned slopes) which is so active because of its steepness that disturbance is severe even on its surface, with the result that its lichen cover remains scant. Less active felsenmeer nearby is relatively dark-toned. The cause of the steepness of the alpine slope in Figure 2 is discussed later.

Today the boulders of New England alpine felsenmeers are overwhelmingly of local rock, riven from the bedrock of the range since continental deglaciation. When the continental ice receded, the first boulders heaved to the surface of the drift deposits on the uplands were presumably in large part erratics (glacier-carried stones of non-local rock types), like those still being upheaved from till soils in New England hilltop pastures. Most of the drift material on the upper slopes of the Presidentials and Katahdin has since been lost, though pockets of till and some weathered erratics remain.

Other Studies

Lougee (1955) has described the internal structure of alpine felsenmeer as it was seen during the excavation of the foundations of the Air Force jet engine laboratory. The boulder layer and congeliturbate layer were just as they have been described above and as they appear in many exposures along the carriage road and elsewhere. As excavation for the foundations proceeded, melting of soil frost flooded the excavation with thaw water which was unable to drain away into the ice-filled crevices below. The bedrock eventually exposed was not the abraded surface

left by the continental glacier, but instead had been vigorously quarried by frost to produce the boulders of the felsenmeer. The shattered surface which remained was not even fresh rock, the mica schist characteristic of Mount Washington having been progressively altered into clay wherever thaw water had regularly penetrated its crevices.

This last observation was unexpected, since it has been widely believed that low-temperature weathering is almost entirely mechanical rather than chemical. However, Williams (1949) has noted that, because of its low temperature and high degree of aeration, thaw water emerging from snowbanks is likely to contain much more carbonic acid (CO_2 in solution) than warmer water, from which CO_2 tends to be driven off. On the basis of observations in Pacific Coast mountains, Williams described nivation (weathering and erosion associated with persistent snowdrifts) which seemed due to that property of melt water. Probably the aeration of thaw water in New England alpine felsenmeers, also, is quite complete, since it remains widely dispersed among the boulders instead of gathering into well-defined stream channels. One would thus expect it to contain considerable carbonic acid and to cause deterioration of the underlying rock. This hypothesis will be referred to again later.

Büdel (1937) made observations on felsenmeers in Central European *Mittelgebirge* (minor mountain ranges) which seemed to support Antevs' conclusion that the Presidential felsenmeer is static at present. Büdel noted that his central European felsenmeers are sometimes tree-covered, that their blocks are weathered, and that other deposits often cover them. New England felsenmeers might be described similarly, except that superficial deposits on active felsenmeer are always discontinuous enough to permit Balch ventilation. Locally, apparently in sites climatically less rigorous, Büdel found felsenmeers overlaid by bog or by soil which had developed a profile, the zones of leaching and redeposition intersecting the uppermost blocks. In such cases, the joints among the boulders having become filled, the blockfields no longer function as felsenmeers. Since Büdel's study area was never glaciated, such blockfields may indeed be relics of Ice Age climate. Static felsenmeer as old as that cannot exist in New England, which was covered with continental ice at that time. Considerable areas of such felsenmeer, presumably dating from the climax of local post-continental glaciation in New England, do exist in that range beyond the present margins of active felsenmeer.

Wasting and Gradation of the Alpine Uplands

The shape of New England mountains is a function of the geomorphic processes which have been active on them. In the

area shown in Figure 1 and on the Presidential Range generally, alpine slopes are consistently less steep than adjacent subalpine gorge walls because mass wasting erodes them vigorously, yet inhibits dissection. Figures 1 and 2 of Part I show extensive alpine surfaces ("lawns") with much less gradient than the alpine slopes in Figure 1 of Part II. Their subalpine margins are consistently steep. An area of such "lawn" is shown in the lower half of the present Figure 2.

We have seen that weathering of the Presidential alpine surface is vigorous (further evidence of that fact will be presented in Part III), yet mass wasting removes the weathered material from even its most moderate slopes so efficiently that no important static accumulations of detritus are present there. On the other hand, few outcrops of really significant size stand above the felsenmeer on the alpine uplands of the range. Katahdin is an even better example of such conditions than are the Presidentials. In both respects New England mountains differ sharply from mountains elsewhere which have many cliffs, towers, and deep talus accumulations on their alpine surfaces.

Various forms of frost-caused creep and flow of soil (among which felsenmeer creep is the dominant process) do essentially the whole work of erosion on the Presidential alpine upland at present. There are practically no stream channels in the alpine zone (note that there are none shown above timberline in Figure 1) in spite of an average of 70 inches of precipitation recorded at the summit observatory each year. Where the runoff, dispersed beneath the alpine felsenmeer, begins to gather into streams near timberline, it is characteristically clear and free of silt or any other evidence of substantial detritus load. Any work done by running water above that level must therefore be quite local and subordinate to mass wasting.

It is significant that the distribution of detritus on the New England alpine uplands is remarkably wide and even, especially in view of the glaciation of the upland during the Pleistocene. To assume that the form of such uplands is largely glacial in origin, or to believe, as the Goldthwaits did with respect to the Presidential Upland, that they are remnants of an ancient surface graded at a lower elevation and then uplifted, would be to accept the implication that the uplands have never adjusted themselves geomorphically either to their present position or to a climate resembling the one they have at present. If that were true, vigorous mass wasting such as occurs on them at present should cause rapid accumulation of detritus in some places and should expose large outcrops in others. Only locally and by chance would the supply of detritus by various means to any given place be in balance with the present means for its removal.



Will F. Thompson

Fig. 1. MOUNT WASHINGTON OVER BURT RAVINE



Will F. Thompson

Fig. 2. THE LEE SIDE OF MOUNT WASHINGTON

In other words, the alpine surfaces would not be graded with respect to present geomorphic processes.

As a matter of fact, the alpine surfaces and those subalpine surfaces not modified by local alpine glaciers seem remarkably well graded with respect to current mass wasting, even in places on the Presidential Upland where mass wasting has not yet become established over the whole surface since continental deglaciation. Differences between the Presidential alpine upland and the almost completely graded Flattop summit surface in the Colorado Rockies, formed by and occupied by similar mass wasting processes, seem to be largely due to the fact that the one has been moderately abraded by continental ice and the other has not been glaciated at all. The Colorado example, like the New England alpine uplands, has had local subalpine glaciers around its margins, fed by drifted snow, but it has never had any ice on the "summit surface" proper. The differences between such upland surfaces in the two regions are minor and it is evident that present erosional tendencies will restore nearly complete gradation of the Presidential alpine zone within a very short time, geologically speaking. The Katahdin alpine upland is already approaching complete gradation again.

On the lip of the Great Gulf cirque, shown to the left of the curve of the Cog Railway in Figure 1, there are some low and inconspicuous roches moutonnées (ice-abraded bedrock outcrops), now greatly weathered and riven, which are the principal remaining exception, other than the cirque headwall, to complete domination of the alpine area in the picture by graded felsenmeer. The same is true of other roches moutonnées in the Presidentials, which are found especially in places severely abraded by continental ice, such as cols, and are also generally near timberline, where alpine weathering is least powerful. The best preserved roches moutonnées are in the Lakes of the Clouds col (Fig. 1 of Part I), which is broad and low, and was especially well situated to carry a strong flow of continental ice. The riven surface was apparently so completely stripped from such places that frost had very little initial entry into the surface after deglaciation, and riving has been delayed. Nevertheless, such surfaces usually depart by only a few tens of feet at most from accordance with adjacent graded felsenmeers and in general are reverting to felsenmeer without much change in the contour of the slopes.

Few roches moutonnées remain on the Katahdin alpine upland, though erratics on the mountain's summit prove that it was entirely submerged by the continental ice. Gradation of the alpine surface has been so completely restored that it resembles the Flattop Upland in that respect more than it does the Presidentials. It is thus a reasonable inference that the broad form of

the alpine surfaces of both the Presidentials and Katahdin had been determined by felsenmeer creep and allied processes prior to at least the most recent continental glaciation.

Lack of stream channels on the New England alpine uplands is due to overloading of incipient channels by mass wasting, similar in effect to the overloading by creep and landsliding which has retarded subalpine stream-channel cutting in Burt Ravine. If the alpine felsenmeer were inert, stream erosion acting on such gradients as those of the alpine zone in Figure 1 would long ago have dissected the slope or stripped off its mantle. However, because the felsenmeer is active, any incipient channel is soon blocked by boulders spilled into it by frost disturbance of its banks. Moreover, convergence of felsenmeer creep tends to obliterate any depression which remains. Drainage of rain and melt water is consequently kept dispersed and geomorphically ineffective, as noted above. Mass wasting thus protects the alpine surfaces of the Presidentials and Katahdin from dissection much more completely than it does their subalpine surfaces, and at the same time still further reduces alpine gradients.

The Base Level of Alpine Gradation

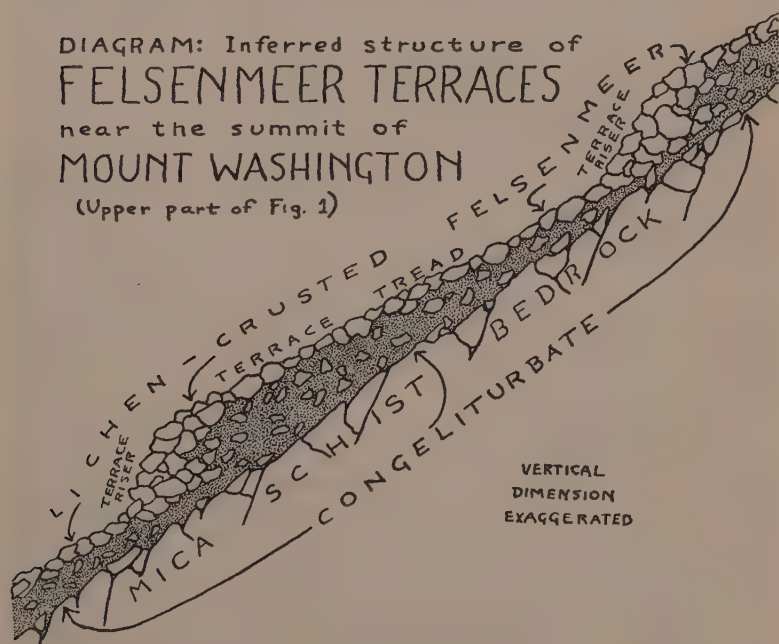
The term "graded", used to describe the slopes of the Presidential Upland in this study and in those of the Goldthwaits, implies to geomorphologists the existence of a base level of erosion at the toe of the graded profile, controlling its down-wasting by limiting the transport of detritus farther down the gradient. Ultimate base level is said to be that of the sea; barriers at higher levels which exert such control are called temporary base levels because erosion eventually removes them.

The complex gradients between the summit of Mt. Washington and the floor of Burt Ravine (Fig. 1) are typical of such slopes on the Presidentials and Katahdin and are not due to any geologic structure at timberline acting as a temporary base level for the alpine slopes above it. Nowhere in New England does timberline seem related to any geologic structure; it is strictly a climatic boundary. On both the Presidentials and Katahdin, such mountainsides lacking cirques are consistently divisible at timberline into two zones of graded slopes, the lower being formed by dissection of the upper, as may be seen in Figure 1. Moreover, from top to bottom of the slope illustrated and on similar slopes elsewhere in the region, the pre-glacial gradient of wasting and drainage remains essentially uninterrupted, either by outcrops or by accumulations of detritus not responsive to current mass wasting. Thus such a mountainside might be considered a single graded slope the profile of which has been distorted by climate-controlled differences in geomorphic processes at different levels. On the other hand, one may consider that the effect of the sharp

discontinuity in wind velocity which exists at timberline, resulting in removal of snow above that level, is to create there a climatic base level geomorphically analogous to a "temporary" base level due to structural discontinuity in the resistance of bedrock to weathering and erosion. A discontinuity in resistance does exist, but it is caused by a difference in climate, increasing the effectiveness of frost upslope, rather than by any difference in lithology or geologic structure.

Felsenmeer Terraces

More complete understanding of felsenmeer creep can be gained by studying the terraces which form a conspicuous pattern immediately below the summit buildings shown in Figure 1. (See diagram.) They are giant forms of a repetitive pattern



associated with solifluction, which Carl Troll (1943-44) calls "stone garlands", and are very common on New England felsenmeers. Felsenmeer creep is a form of solifluction, the "flowing" soil (actually creeping due to frost heave) simply being overlaid by a layer of frost-heaved boulders. The riser of each of the summit-cone terraces in Figure 1 is a windrow of giant felsenmeer boulders kept free of soil (congeliturbate) not only by upheaval but also by melt water and rain water, which erode more effectively within the steep riser-masses than elsewhere on the moun-

tainside. Each riser thus becomes a deeply open-jointed, strongly frost-resistant structure, vulnerable to creep only because of powerful thrust from upslope and because its downslope toe rests on congeliturbate rather than bedrock.

The tread of each terrace seems to be a pavement of boulders somewhat smaller, generally speaking, than those of the risers. They overlie an especially deep mass of silt-rich congeliturbate. Terrace widths are highly variable according to the steepness of the slope. Such tread-masses would creep down the mountainside very rapidly except for the boulder-windrows which retain them. The pattern visible in Figure 1 indicates that the retaining boulders have frequently been thrust aside or overridden, so that lobes of tread material extend downslope from the terraces. In such outbreaks, coarse boulders previously upheaved from the mass are presumably carried rapidly downhill on its surface, which must move much faster than the initially frozen underlying material. As they spill over its snout, the boulders must be stripped of soil by rain and infiltrating melt water, and thus form a new frost-resistant retaining wall.

The patchy pattern of scrub timber (*krummholz*) at timberline, high on the headwall of Burt Ravine, is inherited from that of alpine terraces which have crept down the mountainside until scrub conifers became established on their treads. The intervening areas of coarse *felsenmeer* at timberline represent the risers of the terraces, now somewhat dispersed because of the steepness of the mountainside below the rim of the ravine. A similar transition at timberline from alpine terraces to scrub-covered ones is well shown in Figures 1 and 3, Part I, at the head of Ammonoosuc Ravine.

The character of the alpine terraces shown in Figure 1, and the ability of mass wasting to exclude stream channels from the alpine zone, both imply creep substantially more active than previous students have considered possible. Antevs considered creep unlikely but could not dismiss it altogether. He said that "the slowness with which frost may act and yet, because of its wide occurrence, cause notable changes, makes it difficult to form an idea about its present importance". If, instead of being feeble, such processes have been powerful in New England mountains for a long time, interrupted relatively briefly by continental glaciation, they seem a sufficient explanation of the shape of the Presidential and Katahdin Uplands.

The Lee Side of Mt. Washington

Climatic differences cause geomorphic contrasts in the Presidentials not only between places at different altitudes, but also between places at the same level. The most obvious case in point is the development of glacial cirques instead of stream-cut

ravines in shady and lee-side (east slope) subalpine locations, a process to be discussed in Part III. Above timberline blown snow also has effects. Because such effects indicate the degree to which felsenmeer creep and solifluction are modified by climate and climate-controlled circumstances, they will be described here as they appear on and above the Alpine Garden lawn on the east side of Mt. Washington. That area is shown in Figure 2; also in context in Figure 2 of Part I. Figure 1 of Part I shows the gradients of the slopes in question. Elsewhere in New England such lee-side alpine lawns seem generally to have been destroyed, or their gradients affected, by encroaching cirques, so that the present discussion is about an isolated case. It must therefore stand by itself and cannot be confirmed by reference to closely analogous situations.

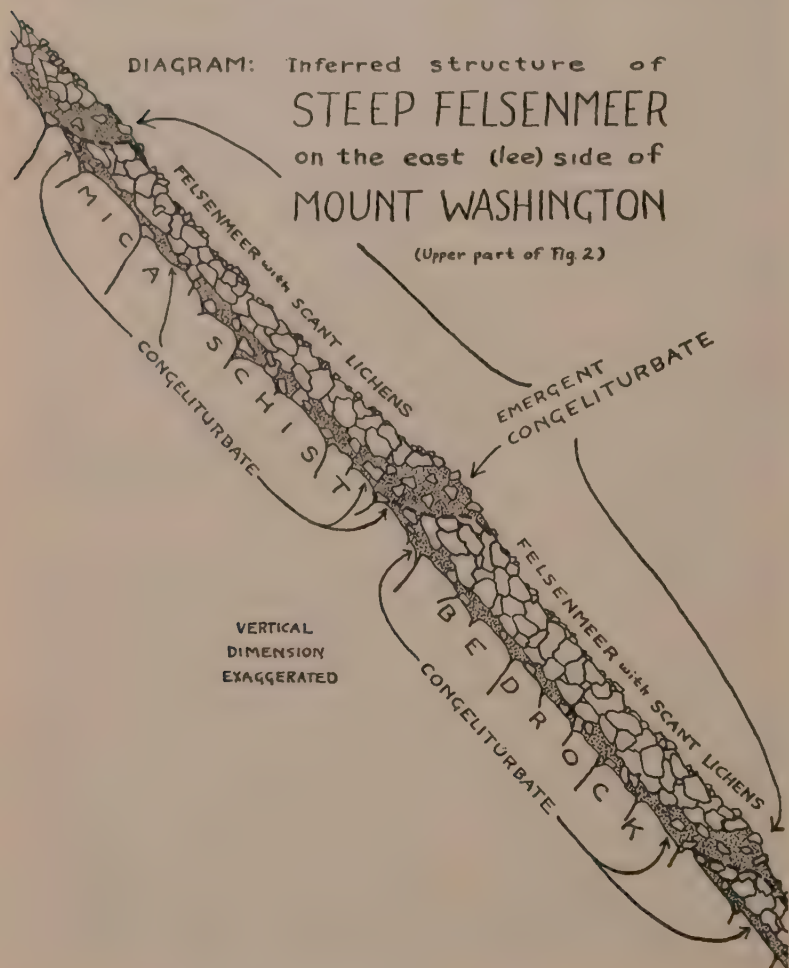
The light-toned slopes in the upper half of the present Figure 2 are particularly steep "cone slopes" leading up to the crest of the mountain. They are graded, generally speaking, yet their felsenmeer has an especially dynamic-appearing pattern. The light tone of the slopes is due to surface disturbance which permits only scant lichen cover on the boulders. Inconspicuous and badly shattered outcrops shown to the right of the center of the picture indicate rapid wasting of the slope, which has thus lost its graded status in that sector. Even larger outcrops, similarly shattered, occur on the continuation of the cone slope to the left of Figure 2.

The lower half of Figure 2 shows a segment of the Garden, a low-gradient lawn surface at timberline, isolated quite recently from accordant lawns to the southward by headward erosion of Tuckerman Ravine (see Fig. 2 of Part I). Huntington Ravine has similarly been eroding headward into the northern part of the Garden, but it gets less snow than Tuckerman. Its glaciers have consequently been smaller and have made less progress headward. Headward erosion of Tuckerman has been favored not only by the supply of snow, but also by a vein of weak, altered rock in its headwall. No such weakness seems to have determined the form of the Garden surface, which bevels quite regularly various layers of mica schist of uneven strength, all dipping steeply toward the mountain. The surface of the Garden is quite well graded, is entirely boulder-mantled except for a few areas of finer detritus, and is subject to mass wasting everywhere.

The subalpine slope below the Garden is fully as steep as the cone slope above (see Fig. 2 of Part I). It may be a section of the headwall of a cirque older than either Tuckerman or Huntington. For purposes of the present discussion it is sufficient to observe that it has long been occupied, and graded, by steep subalpine felsenmeer, so that its surface somewhat resembles that

of the walls of Burt Ravine. Since becoming graded it has been undercut by local glaciers flowing down from Tuckerman and Huntington Ravines. Such outcrops as it has are due to that circumstance.

The contrast in slope between the graded Garden surface and the more or less graded surfaces above and below it is the crux



of the present discussion. It will be shown that the cone slope is furnishing large amounts of detritus to the Garden surface, yet such detritus is not accumulating on the Garden to the extent one would expect. Indeed, the Garden itself may be furnishing considerable detritus to the steeper subalpine slopes below. The break in slope at its lower margin is nevertheless much more

abrupt than that at timberline in Figure 1, simply because the Garden is so nearly flat. Felsenmeer creep seems important on all three slopes being discussed; the questions are, how does it adjust itself to the various circumstances in which we find it operating, and to what degree is it responsible for the rather irregular lee-side profile of Mount Washington? The answers given here may not be final, but the matter is one of considerable interest and should be discussed.

The steep cone slope above the Garden loses some snow in the form of avalanches which descend to the Garden surface. Some is also lost by drifting, due not to the full strength of winter gales but rather to the violent turbulence they generate in the lee of the summit. Melt water from the remaining snow moves rapidly down through the cone-slope felsenmeer to the Garden, across which it must flow less rapidly because of lower gradient. The dark (vegetated) patches on the steep slope are congeliturbate masses analogous in origin and composition to the tread-masses of the terraced western slope of the summit cone, but they are behaving differently. (See diagram.) The dark tone of the alpine vegetation which covers many of them indicates fine-textured mineral soil close to the surface, supporting vigorous growth. Each congeliturbate body is presumably in the form of a wedge, the thin end lying on bedrock upslope, overlain by soil-free felsenmeer. The blunt end of each wedge is emerging downslope, overriding the soil-free boulder mass below and washing and sloughing away as it emerges. Hence the streaming pattern in the upper left of Figure 2. Boulders heaved out of emergent congeliturbate patches, or sloughed off from them, accumulate on the intervening soil-free boulder slopes, which are therefore relatively free of lichens. Fine soil from each sloughing congeliturbate patch may come to rest under the boulders on the buried surface of the next wedge of congeliturbate downslope, or it may be carried down to the Garden surface by rain or melt water.

To the right of the center of Figure 2 there is shown a small accumulation of talus at the base of the summit-cone slope, derived in part from low outcrops upslope and in part from felsenmeer and congeliturbate which creep and slough down over the outcrops. To the left of the center of the picture there appears practically no talus accumulation at the base of the slope. In view of the evident mobility of the cone slope above that point, we can only conclude that detritus there reaching its base must be carried away by some means down the moderate slopes of the Garden as fast as it is supplied. It would appear from the patterns on the lawn surface in that area that the geomorphic agent responsible is a variant form of felsenmeer creep, forming unusually mobile terraces.

High mobility of detritus on a slope as moderate as that of the Alpine Garden implies much fine-textured soil and an abundance of moisture to form and re-form soil frost. Such a situation is favored at the upper margin of the Alpine Garden by several circumstances. We have seen that congeliturbate upslope is subject to sloughing and erosion, a process which reduces the congeliturbate content (and therefore the mobility) of detritus on the steep summit-cone slope to such extent that it is not subject to landslide. The fine-textured material thus displaced comes to rest within felsenmeer on the Garden surface at the base of the steep summit slope. Water to form soil ice must also be especially abundant there, having drained down the slope or emerged from joints in the bedrock.

Water draining down the cone slope presumably becomes well aerated on the way, but it remains low in temperature because of the year-round presence of soil frost in the congeliturbate masses over which it flows. It is thus especially able to absorb CO_2 . Snow accumulates at the base of the cone slope each winter, having drifted off the summit above. It lies late in spring, and its thaw water must also be very well aerated and must consequently contain considerable carbonic acid, as did the melt water of the snowfields studied by Williams (1949). Water from both sources is thus presumably capable of causing low-temperature chemical weathering of the sort described by Williams. It is not unreasonable to assume that considerable clay is thus formed both within the detritus on the Garden surface at the base of the cone slope and in bedrock underlying it. The clay must contribute greatly to the mobility of the terrace-masses observed there.

We may even infer that in the long run, both before and since continental glaciation, especially active chemical weathering due to concentration of melt water at the upslope margins of the Alpine Garden has permitted the Garden to extend itself in that direction, its rapid weathering and mass wasting undercutting the now obviously over-steepened slope above it. If that is true, the development of the Alpine Garden more or less parallels that of true alp slopes, as discussed in Part I. No such situations have been observed elsewhere in the Presidentials or on Katahdin, so that the possibility remains that the form of the Alpine Garden is in part structurally determined. However, both the Garden and the graded slope of the summit cone bevel the known structures underlying them very regularly and at a considerable angle.

Masses of coniferous scrub (krummholz) grow on the upper part of the Alpine Garden and on some of the congeliturbate exposures upslope, sheltered in winter by snowdrifts which accumulate there (Griggs, 1946). Other phenomena on the surface of the Garden also tend to place it in the timberline zone rather

than fully in the alpine zone. Frost heave on its surface forms extensive areas of felsenmeer, but other areas are dominantly of fine-textured congeliturbate material deposited by rain and melt water drainage. It is in such areas that active formation of miniature solifluction terraces, polygons, and striped soil was observed by Antevs (1932) and R. P. Goldthwait (1939). Such patterns are created by shallow short-period frosts in spring and fall, rather than by deep annual frost. The kind of mass-wasting processes of which they are a manifestation erode mountainsides effectively in less seasonal mountain climates (Troll, 1941, 1943-44) and probably contribute considerably to the total mass wasting on the Garden. In two non-felsenmeer areas on the Alpine Garden as shown in Figure 2 there are faintly developed stream channels. Neither stream is large enough to move a boulder of significant size and neither seems to be continuous across the Garden surface. The downslope margin of the Garden is much more windswept than its upper part. It therefore has alpine vegetation and a more typically alpine felsenmeer than the higher-lying snow-sheltered zone at the base of the summit cone. Detritus creeping down into the subalpine zone across that margin of the Garden seems to help inhibit stream erosion there, as similar creep does on the walls of Burt Ravine.

Note in the above discussion that all the slopes studied seem to be reasonably well adjusted at present to the processes active on them, so that drastic change in slope conformation is not to be expected as the result of their current operation. It would thus appear that the effect of felsenmeer creep varies with environmental circumstances (mostly climatic, microclimatic, and edaphic), and that the form of the lee slope of Mt. Washington reflects long continuance of such circumstances, interrupted only relatively briefly by continental glaciation.

Summary

The most characteristic geomorphic feature of the New England mountains is the climate-caused differentiation of their alpine and subalpine zones, mass wasting being much more completely dominant, and slopes in general decidedly less steep, at alpine levels than in the upper subalpine zone. The alpine-subalpine boundary, coincident with timberline, follows a line above which powerful gales characteristic of such altitudes in New England consistently strip off most of the winter snow cover.

Because removal of most of the snow by wind permits effective Balch ventilation of the felsenmeer beneath, soil frost is more powerful on the New England alpine zone than might be inferred from weather records. The alpine zone thus has continuous permafrost. The subalpine zone has considerable, but much less, permafrost. It occurs especially far down the mountain on the

more heavily shadowed boulder slopes. A layer of frost-stirred silty, stony soil (congeliturbate), which may itself contain perennial frost, is sandwiched between the frozen bedrock of the higher mountainsides and their superficial blanket of coarse, open-jointed felsenmeer boulders. Seasonal formation and thaw of segregated ice masses within the congeliturbate layer makes it creep downslope quite actively, along with the overlying boulder blanket, which itself is quite frost resistant. The depth of the boulder blanket, in most places in the higher Presidentials, is such that surface boulders are not rotated rapidly in relation to one another. A pattern of very large lobate terraces formed by the creeping of the felsenmeer is thus the most common surface feature indicating effective mass wasting of the alpine uplands.

Such mass wasting is so vigorous that stream erosion is almost entirely excluded from the alpine surface. Incipient stream channels on it are obliterated by the creeping felsenmeer, which fills them with boulders. No other geomorphic process active on the uplands tends to dissect them. However, the uplands are actively undercut or worn away at their lower margins by subalpine processes.

Felsenmeer creep is also very active on the steeper slopes of the subalpine zone although, because of deeper snow cover, frost is less powerful there than in the alpine zone. Less frost heave is needed to cause active mass wasting on steep slopes than on moderate ones. Landslides are also common on steep subalpine slopes. Their scars are healed quite rapidly by creep and soil formation. Creep and landslides contribute a great deal of coarse bedload to subalpine streams and have thus restrained down-cutting of their channels and delayed the dissection of the alpine zone above.

Drainage of water and ice (local glaciers) has nevertheless carved many deep subalpine ravines on the flanks of the range. On the windward side of the Presidentials such ravines are consistently fluvial in origin and sharply V-shaped in section. Their walls are steep but well graded and pass upward without a break into the less steeply graded slopes of the alpine zone. In leeward and shaded locations snow blown off the uplands has in the past accumulated in the ravines to form local glaciers, the effects of which will be discussed in Part III. Continental ice submerged the range but modified its form much less than have local glaciers. Erratics and other drift material left by continental ice are widely but sparingly distributed, much drift having been lost by weathering and mass wasting.

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A GLIMPSE OF THE OLYMPICS

by WILLIAM W. BIDDLE

SO YOU'RE GOING TO THE OLYMPICS!" No phrase could have been more capable of misinterpretation. The Olympic Games were then—in the summer of 1960—being held in Rome, and an explanation was always necessary to convince questioners that our Olympics were mountains, not footraces. Even after the explanation most people were still vague as to just where they were.

This vagueness about the Olympic Mountains has more reason than one might at first admit. True, they can be found on a map of the state of Washington, located west of Seattle on a peninsula which is almost all mountain. Then, too, the height of Mt. Olympus—7954 feet,—the tallest peak, will be on this same map and there might even be some information about the National Park which has kept the Olympics unspoiled. But none of this will tell you of their snowy grandeur or of their hoary rain forests, and none will give you a glimpse of their noble Roosevelt elk or their outsized black bear. Only a visit can give this, and even then you may not be lucky enough to see it all.

For the Olympics are hidiers, with their summits often shrouded in clouds and their bases dripping wet; they show themselves only at a few highly select times. July can be a fine clear month, but often deep snow slows down travel; or August may be clear, but then the days are shorter and the chance of fresh snow is considerably increased. Sometimes a summer will give a four-week stretch with every day almost perfect; then another summer will give only a few weeks total time of fine weather. So, with this in mind, my wife Barbara, her brother Jimmy and I planned a six-day trip in mid-August and hoped for the best.

Using the Leissler guidebook, I picked the Skyline Trail in the southwestern corner of the National Park. This old fire-trail was to be recairned that August and a good thing it was, too, as without this trailwork done by the Student Conservation Project we never would have traversed the whole route. For an Easterner used to marked trails, the Skyline Trail is a real challenge; the elk do a better pathmaking job than humans, and he who follows an elk trail may never find his way out.

Fortunately, there are shelters on the connecting trails approaching the Skyline Trail, but on the Skyline itself a tent is

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MOUNT SEATTLE FROM THE SKYLINE TRAIL



William W. Biddle

DESCENDING MOUNT SEATTLE



A MEADOW ON THE SKYLINE TRAIL

William W. Biddle



VIEW EAST FROM LAKE BEAUTY

William W. Biddle

an absolute necessity. At the minimum, two days are needed for its traverse, with one night on it. Approach to either end of the trail is a further walk of one or two days, so that the round trip of 43 miles from the road in and out may come to five days in all.

The rain forests, the open meadows and the deep snowfields of the Olympics often give the Eastern walker major problems. The rain forests, where the trees are so huge as to be almost unbelievable, are fascinating. But up higher the meadows—wide, open grasslands where wildlife abounds—take over and the few solitary trees look deceptively small. It is here in the meadows that one can become almost hopelessly lost; elk trails branch every which way, trees are too few for blazing, and piles of rock may or may not have been old cairns. And when the meadows finally merge at the 5000-foot level into deep snowfields or open rock, how can any way be found? All these problems are inherent in the Olympics, but with patience and commonsense each can be met.

Our two-day trip to the northern end of the Skyline Trail was a perfect one—bright sunshine, an easy trail, and the magnificent hush and sublimity of the rain forest. At Low Divide, the start of the trail, we spent our rest day climbing Mt. Seattle, 6246 feet, a rotten-rock, snow-blanketed, trailless peak. Due to lack of time we did not quite make the summit, but I was able to get some fine pictures, particularly one of Mt. Christie and its beautiful glacier, and one of some bear tracks in the snow which strongly resembled those of the Abominable Snowman.

While at Low Divide we spoke with Jack Dolstad, Ailene Kane and Barbara Hart, who were there with the Student Conservation Project boys. After a long session of route discussion with Jack we turned in, with black clouds looming up in the west and a brisk but warm breeze.

The night felt chilly about 3.00 a.m., but it was downright cold at 6.00 a.m., when I peered out and saw that snow was falling down almost to our shelter. In fact, whereas there was hardly a flake on the ground around us, the tops of some of the high trees nearby were covered with snow. This presented a discouraging prospect for a trip along a trail which was open, with magnificent views, for much of its length; but after stalling as long as we could we headed up into the swirling mist and wet snow.

The walk from Low Divide to Lake Beauty was as wet and chilly as the Olympics could offer in mid-August. Perhaps the wettest part was a section, of about a quarter of a mile, where 110 logs had to be crossed. Although the trail was well marked, we often became confused by the criss-crossing elk trails. Shortly before reaching Lake Beauty we met the second half of the SCP group, led by George Blanchard, and learned that they had been

quite miserable encamped at Lake Beauty. After we had left them a rare double rainbow (or was it a snowbow?) raised our spirits slightly, but darkness was almost upon us.

Night fell rapidly as we reached the lake, but not too soon to detract from the wilderness atmosphere of the spot. It was really to be a night on our own, amidst a strange treeline forest; and with the snow soaking our backs and a roaring fire warming our fronts we ate, and then squeezed into our army mountain tent.

Morning, I felt, just had to bring some clear weather, so with high hopes after a damp sleep I squirmed out of the tent at 5.00 a.m. and saw Mt. Olympus—and there was no need to ask why the Greeks had said that Olympus was the home of the gods. With fresh snow covering the whole mountain and a bright sun hitting the summit, I have never seen anything more ethereal or alpine than this view of Olympus. We all danced for joy amid the wilderness setting while bolting down a breakfast, but by 8.30 a.m. the clouds had again returned and a light drizzle started.

The next shelter was well beyond Kimta Peak, some 10.5 miles away, and Jack had told us that it was a day and a half from Lake Beauty to the shelter. The prospect of another wet night in the tent, however, spurred us on, and after slogging through deep patches of wet snow, dodging a black bear, and vaguely sighting each cairn ahead, we made Three Prune Shelter with, again, just enough daylight left to get a meal started. At the shelter we found another party trying to decide about going any farther on the Skyline Trail, and with only a smattering of advice they decided not to do so.

The night was pleasant in the shelter, but the next day, shortly after our start, the rain started again in earnest. The sight of a dozen Roosevelt elk in the woods a short distance off the trail was dramatic, but we felt very discouraged to have our final day in the Olympics shrouded in rain and cloud. Even the stillness and beauty of the rain forest could not elicit a response from our dampened spirits until we reached the car.

Nevertheless, the Olympics had offered three Eastern climbers a rare chance to apply some of the route-finding skill and the woodsmanship which are so important for the wilderness trapper. For the novice, a trip into the back country of the Olympic Peninsula is not recommended; but for one who is willing to take the frequent rain along with the sublimity of the rain forests and the peaks, there is much reward indeed in the high country of the Olympic Mountains.

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(Continued from page 315)

South America is represented with nine stations altogether. This includes the present world's highest major observatory, at Chacaltaya, Bolivia, height 17,200 feet. In Japan science has invaded the sacred summit of Fuji with a weather station having accommodations for researchers, and there are two observatories on the top of Mt. Norikura. India is listed with three, and there is one each in Mexico and Africa.

So I advise those with scientific bent and a yearning for the high places to peruse Serge Korff's guidebook and pick a mountain laboratory from the wide choice available. It is doubtful if a cheaper or more rewarding outing could be found.

But I forgot. It is advisable for anyone planning such an elevated sojourn to become "accredited"—whatever that means.

A SNOWSHOE TRIP IN 1924

by MARGUERITE D. BARNES

LIKE A FIRE-BREATHING MONSTER OF OLD the great locomotive of the Grand Trunk came thundering into the Gorham station on a frosty Saturday morning in February. From a special Pullman at the rear of the train some thirty husky-looking trampers straightway emerged and divided themselves into various groups.

One group gathered around a long, heavy two-horse sled onto which, in rapid succession, many trunks were being loaded. Anxiously each person tried to identify his own particular piece of baggage, in order to reassure himself that the climbing of the coming week would not have to be done minus the proper equipment. A second group was busily engaged in packing up skis, ski poles and ice-axes, and in sorting out hand luggage; while the individuals of a third group were putting on their rucksacks, adjusting their outer clothing for better protection against the sharp wind, and looking about with joyous anticipation. After all the activities centering on and around the platform had ceased we (for I was one of the party) adjourned to the combination drug store and gift shop of Mr. Shorey, a well-known Appalachian.

Fortunately, Mr. Shorey had been forewarned of the human avalanche that was to descend upon him and he gave us a most cordial welcome. The quantity of hot chocolate and crackers consumed and the amount of sweet chocolate, nuts and postal cards purchased were amazing. By noontime our wants seemed to be satisfied, so, with the exception of a few who chose to ride with the baggage, we set out for Pine Mountain.

The easy ascent of Pine Mountain brought color to our cheeks and joy to our hearts. How good it was to feel the deep, dry snow once again under our snowshoes, to see the sunflecked trail ahead, and to hear the wind rushing through the tops of the pine trees! When we reached the first high, open spot one glance back over the valley in which Gorham and Berlin nestled and one glance across at Mt. Madison and Carter Notch were enough, for the piercing wind was blowing so hard that it was all we could do to stand and we were glad to drop down into the shelter of the

MRS. JOSEPH H. BARNES, née Marguerite Daniell, a member of the Club, first joined in 1917. She has taken part in many A.M.C. trips, both summer and winter, and has also climbed in the Canadian Rockies and in Switzerland. Mr. and Mrs. Barnes were donors of Owl's Nest cabin, which they occupied for parts of a dozen summers, to Cold River Camp.

The following account, of an early "Bemis Crew" trip to the Glen House, conveys a good idea of the size, make-up, and strenuous climbing schedule of this group in its heyday; also, of the size and character of other A.M.C. snowshoe parties of the same period.

woods. After descending abruptly for several hundred feet we reached an old logging road leading into the Dolly Copp road which, in turn, brought us out onto the Pinkham Notch state highway.

Upon reaching the highway we no longer kept together but separated into divisions according to the speed at which we wished to travel. It was just about four o'clock when a friend and I rounded a curve in the road and saw the great white dome of Washington gleaming in the rays of the setting sun and to the north the bright peaks of Jefferson, Adams and Madison. We stood still a few minutes, watching the rapidly changing color and the play of shadows on the mountains, and then went on a little farther to the Glen House.

At the Glen House our friends who had ridden up from Gorham greeted us with hot tea and cookies, a most welcome attention after our ten-mile tramp. There was still time enough left for us to unpack at least partially and change our clothes before dinner.

Dinner! Such a meal! Nectar could never have tasted better to the gods. After hearing announcements on present affairs and future plans we all went into the front livingroom. In one corner Jack and Marjorie Hurd, the historians of the party, began poring over maps, estimating distances and recording statistics. In another corner Joe Walcott opened up his metal trunk, which contained materials and a tool for every kind of repair work. In no time he was surrounded by an admiring, inquisitive and would-be industrious circle of men. The snowshoe creepers were not fastened on to the satisfaction of one critic, who at once set to work to make them more secure with newer and stronger thongs. Another man seized a punch and began skillfully to make holes in the straps of some snowshoe sandals belonging to an onlooking girl. A third individual busied himself with the sewing awl, doing a fine piece of work on a tear in his rucksack. Had I not known my friends as well as I did, this concentration upon repairs would have led me to believe that every person in the party had left home with his equipment in the last stages of safety and usefulness.

While these people were happily entertaining themselves, others had drawn up their chairs before the big fireplace and were talking over trips, past, present and future. Now and then they turned to address a remark to the line of smokers sitting back against the wall. These smokers were contentedly taking in the things going on about them. They kept pretty quiet for the most part, except when somebody started an argument on the superiority of crampons over Rogers creepers, or upon the advantages of some other special kind of equipment over a rival.

When the hour of ten arrived most of us were in our beds, where we slept soundly until quarter to seven the next morning.

The morning proved to be clear, cold and still, so of course Mt. Washington was our goal. Carefully packing our rucksacks with extra clothing, creepers and white canvas lunchbags, at about 8.15 we started out across the field on our snowshoes, with ice-axes in our hands. It was a colorful procession that made its way up the Carriage Road. The wearer of a bright blue parka had on a scarlet cap; the green-and-black-shirted man was followed by a girl with an orange toque and scarf; a navy blue tam was on the head of the man wearing the white parka and gray socks, while behind him came the girl who had successfully dyed her T-shirt cerise. Everybody wore at least one article of brilliant hue.

The first four miles of steady, gradual climbing proved a little dull and we were glad when the Halfway House came in sight. In the lee of the building we put on extra clothing, removed our snowshoes and stowed them in our rucksacks, and adjusted our ice-creeper. After eating a few raisins and some sweet chocolate we continued our climb.

As we were now above timberline the miles no longer seemed monotonous. The distant views of the snow-covered country, thickly dotted with glistening white mountains, made me feel as though I were a bird gliding high in the air and looking down upon Fairyland. Nearer and nearer the summit we approached, now traveling over strong crust, again across sheets of ice, and occasionally through small drifts of snow. Soon the railroad trestle appeared—not the dark, uninteresting wooden structure of summer days but a glorified trestle, truly beautiful in the covering Jack Frost had made for it. As I looked up at the Summit House it had the appearance of a giant cake covered with thick white frosting. In a few more minutes I was standing on the summit platform, scarcely able to believe that I was not dreaming.

But before long the low temperature reminded me of this and I hastened to join my companions in Camden Cottage, the small building west of the Summit House. Two boys, who had come up earlier than we, had a merry fire burning in the rusty iron stove and we partook of hot tea while eating the sandwiches, cookies, prunes and oranges contained in our lunch bags. Between sandwiches different photofriends, myself included, went outside and snapped pictures. At 1.30 seven of us were ready to start down the mountain.

The seven consisted of five men, another girl and myself. After once more admiring the curious frost feathers on the Summit House, and taking a last long look at the wonderful panorama spread out below us, we went down the north side of the cone

to the rim of the Great Gulf headwall. Filled with awe, we gazed down into the giant abyss which Starr King pronounced "one of the grandest spectacles which the summit of Mt. Washington affords". By carefully planting the spikes of our creepers or crampons into the solidly packed snow at every step, and at the same time holding onto our ice-axes, the picks of which were securely lodged in the crust, we cautiously and safely descended the 300-yard wall. As we stood in the bowl of the Gulf and looked up at the skyline of the surrounding mountains we felt infinitesimal indeed.

Upon entering the forest we followed the blazes of the Great Gulf Trail, which for several miles parallels the Peabody River. This river was for the most part frozen over. Occasionally we left the trail and swung along through the deep snow in the river-bed. By so doing we had several chances to bring out our tin cups and drink from the green pools that lay embedded in the white snow like huge emeralds set in platinum. As the afternoon was fast slipping away we had to increase our pace lest we be overtaken by darkness while still in the woods. To be sure, there was a moon, but its rays could scarcely be relied upon to show up the blazes on the trees. Twilight fell just before we came out into the open and tramped across the field in front of the Glen House.

The dawn brought propitious climbing conditions, so we were up and off on the trail again soon after breakfast. Since this time we were heading for Carter Dome, we did not carry ice-axes. I venture to say that, as we started off up the trail, there was not one person who did not have some painful muscles, but never a word was said about them and no external signs of internal conditions were made manifest. Lame muscles are all in the day's fun on such a trip; besides, the lameness disappears after a few miles of exercise.

After looking inside the Carter Notch Hut and standing around outside looking up at the overtowering sides of Wildcat and Carter Dome, we started up the steep slope of the latter. A great scramble we had! Oftentimes we had to pull ourselves up by means of trees and in some places we even had to crawl on all fours. But by one method or another we reached the summit, where so magnificent was the view of Washington in the morning light that had it been our only view we should have felt amply rewarded for our strenuous climb. But we had 360° of other views as well! After eating our lunches behind the fire warden's camp we decided to go over to the summit of Mt. Hight.

The trail across to Hight from the Dome lies on an open ridge, which proved to be very windy, so we had to draw the furry hoods of our parkas tightly around our heads, making us look like a band of Eskimos. On account of the severity of the

wind on the summit of Hight we could not safely remain there long. We had great fun coming down the mountain, getting some fine slides both standing up and sitting down on our snowshoes. In surprisingly short time we were back at the junction with the Carter Notch Trail and it was not yet four o'clock when we reached the Glen House.

Our early return gave us time for auction and mah jongg, which, with the addition of dancing to limber up our muscles, were continued in the evening. If the weather should be right we planned to ascend the headwall of Tuckerman Ravine on the morrow.

And the weather was exactly right. For the second time, filled with suppressed excitement, we started up the Carriage Road. The snowshoe trail had been packed down so hard on Sunday that we were able to walk on it without snowshoes. At the 2-mile post we branched off to the left on the Raymond Path. The air was crisp and still, the sun was shining down through the trees, the red blood was surging through our veins, and we were filled with joy. When we reached the tiny lean-to on the shore of Hermit Lake we ate part of our lunches before going on up into the open floor of the Ravine.

It is hard to describe the sensation one experiences as he stands on the floor of the Ravine and gazes up at the encircling walls of that colossal colosseum. It makes one feel the question, "What is man that Thou art mindful of him?" Once again creepers and crampons were substituted for snowshoes, which were stored away on our backs, and having put on some extra clothing we started our ascent of the steep thousand-foot wall. The man at the head of the line had to chop steps in the hard snow with his ice-axe and up this frozen staircase we climbed. Since progress was naturally retarded we had time to look at the view behind and below us. A few people did not attempt the ascent and it was interesting to watch them fade into tiny specks below. It was also interesting to look down at the climbers back in line and study the different expressions and postures, and to look up at the ones ahead and watch their different ways of climbing. Some traveled along nonchalantly, others made frequent use of their ice-axes as means of support, while one man apparently climbed with his hands as well as his feet. In due time the rim of the wall was reached and the scaling stunt had been accomplished by twenty-nine proud climbers.

Most of the party wanted to go back by Boott Spur, but my roommate, five men and I wished to revisit the summit. We climbed the crusty south side of the cone in about an hour and again had lunch and tea in the little house. After lunch we spent a whole hour on the summit, looking at the view, studying the frostwork, taking pictures, climbing about on the roofs, and



John W. Van de Water

ON THE SUMMIT OF CARTER DOME

Henry Chamberlain, Ruth Langmuir



John W. Van de Water

CLIMBING TUCKERMAN HEADWALL

The author is the sixth from the top, Ruth Langmuir the first



John W. Van de Water

FIREWARDEN'S HUT, CARTER DOME



John W. Van de Water

AT HERMIT LAKE SHELTER

The author is the fourth from the left, Marjorie Hurd the seventh

altogether having a delightful and unique time. At four o'clock we tore ourselves away and started down the Carriage Road.

Several times we left the road and followed the telephone wire, thus cutting off distance but adding steepness. As we journeyed downward the sun was setting at our backs, casting soft-colored lights on the peaks in front of us, and by and by the full moon rose in the east. We were sorry when we had to drop below timberline but our sorrow soon turned to joy, for we found that the bright moonlight was able to penetrate the forest. The patches of glittering crust, the shadows cast by the trees, the white winding road, and the dark evergreen thickets made a series of pictures which I shall not forget. Upon reaching the hotel we stopped a moment on the piazza to look up at the moonlit range, then went inside to join our merry friends, reluctantly closing the door upon an enchanting world.

The enchanting world of Tuesday had taken on a new form of enchantment on Wednesday. When we awoke the wind was swirling around the corners of the house and the air was packed with big fast-falling snowflakes. To me a snowstorm is always beautiful, but a snowstorm in the mountains is indeed something wonderful to behold. Some of our party thought they would like to go up into Tuckerman Ravine, a few preferred to remain comfortably inside and watch the storm from within, while the rest of us liked the idea of a lunch cooked before the open fire at the Pinkham Notch Camp. On a pair of borrowed skis I quickly and easily went up the three road miles to the camp. I liked the feeling of the damp snow in my face, the sound of the roaring wind, and the sight of the snowladen trees. When we arrived at the camp, at eleven o'clock, we woke up two Boston boys who had been sleeping in one of the buildings since nine o'clock the evening before. As the windows were all boarded over¹ the room was pitch dark and had we not appeared they might have slept all day. They were much astonished to learn that it was snowing hard. After procuring the key to the main hut we went in and built a big fire.

We cooked bacon, fried sandwiches, toasted marshmallows, and then sat in a semicircle around the fireplace and told mountain stories until it was time to go home in the driving storm. After dinner Nat Goodrich read a number of poems aloud to us. At nine o'clock a few people started down through Pinkham Notch to meet two additions to our party who had left Jackson in the latter part of the afternoon. The distance from Jackson to the Glen House is only twelve miles, but on account of the storm it took until nearly midnight to cover it.² We were all a

¹ Except for a refuge room Pinkham Notch Camp was not open in the winter at this period.—Ed.

² The highway between Jackson and the Glen House was not plowed at this time.—Ed.

bit sleepy the next morning, for we had lain awake until the trampers came in.

In spite of our sleepiness we were up at our usual hour and those who had not been in the Great Gulf earlier in the week, and a few of those who had, went up there on an exploring expedition. The storm had abated but there was a high wind, making rather uncomfortable conditions. It was fascinating to watch the great spirals of snow whirling high into the air. Those who did not go into the Gulf had a leisurely day of cardplaying, reading, skiing on the Carriage Road, and taking short snowshoe trips. At dinner a birthday cake and a tray piled high with gifts were brought in and placed before one of our party. The gifts were of three classes; those that had been given outright, those that had been loaned, and those that had been surreptitiously extracted from the rooms. We never knew what article was to be undone next, for everything seemed to be there, from the pet lantern belonging to one of the girls to the recipient's own muffler.

After the party we gathered as usual in the big room. A chair was placed beside the drinking fountain and different people sat in it and related to the assembled audience many amusing, exciting and profitable experiences that had come to them in their mountain climbing. The evening ended with a discussion of our party plans for another year.³

Friday morning the clouds were still hanging low on the mountains, but since the wind had somewhat subsided we climbed Wildcat from a point a little south of Thompson Falls. The trees were laden with feathery snow. Anyone with the slightest bit of imagination could see all kinds of grotesque white figures sitting or standing upon the branches of the young fir trees, with animals and elves predominating. In the midst of so much beauty it would not have been surprising to see fairies dancing on the new-fallen snow. Chickadees sang to us and blue jays chattered their questions. We built a campfire in the woods near the summit of the mountain and lunched beside it, wondering if the stiff sandwiches really did taste better because of it. Soon after lunch we were on the summit. There were no distant views, but we could look across at Carter Dome and straight down several hundred feet upon the hut in Carter Notch.

We slid most of the way down into the notch, with several tears and bruises as a result. Anyone who has never slid down a mountainside on snowshoes does not not know what fun he

³ Toward the end of each trip the Bemis Crew regularly held a meeting at which a leader was chosen for the ensuing year and a locality fixed upon. It became customary to visit the Glen House every alternate year, while in the intervening years trips were made to Franconia, Waterville, Bemis (i.e. Notchland, the Crew's original location), or the Adirondacks.—Ed.

has missed! We followed the Nineteen-Mile Brook Trail back to the hotel, where we dressed for the Washington's Birthday banquet which Mr. Libby wished to give us.

The diningroom, the tables and the waitresses were all elaborately and appropriately decorated for the occasion and we grew more hilarious with every course. A huge, six-layer cake trimmed with red, white and blue was the crowning feature of the meal. We had after-dinner speaking and individual and group singing. (Lew Smith was the hit of the evening, with his original song about the Bemis Crew.⁴) When the tables had been cleared away we had a dance in the diningroom. A very lively Virginia reel proved that the crowd was still filled with surplus energy in spite of the strenuous program of the week. After the dance we all gathered around the piano and sang until we felt we really ought to be thinking of bed. We hoped to be able to climb the headwall of Huntington Ravine the next day.

But when Saturday arrived the wind was blowing and the range looked forbidding. We decided to go up into Huntington Ravine and take a look at the headwall. One look was enough to convince us that we could not climb it. The wind was rushing in great gusts down the mountainside, the snow was blowing, and the temperature was very low. We put on all the extra clothing we had brought and wished for more. As we stood gazing up at the majestic headwall, instead of beckoning to us as did the Tuckerman Headwall, it seemed to tell us to go back. One or two venturesome spirits did climb up the fan a little way, but they were only too glad to come down. We built a fire in a sheltered spot and ate our midday meal beside it, then returned home in the early afternoon. This not only gave us time to pack our trunks and get things somewhat in readiness for departure the next day, but also for skiing or a game of cards. After dinner we gathered for our last evening in the front room.

The tools and what was left of the repair materials were put back into the metal trunk and locked up, skis and poles were brought in from the piazza and strapped together, baggage tags were given out and duly inscribed. There was a continual running up and down stairs and a general atmosphere of excitement. A persistent quartet attempted to get in a final game of auction in the midst of the confusion, but with poor results. From then until well into the early hours of the morning there were sounds

⁴ This song, "We ain't gonna climb no more", became the accepted anthem, so to speak, of the Crew. Sung to the tune of "It ain't gonna rain no more", it contained such stanzas as the following:

Oh, we ain't gonna climb no more, no more,
We ain't gonna climb no more.
But how in heck can I break my neck
If we ain'ta gonna climb no more?

—ED.

of an imminent evacuation. Before breakfast we all had to have our trunks outside our doors and our hand luggage on the piazza. The baggage and a few people were going to Gorham on the big sled, to connect with a special train. This train, after picking up a party of a hundred or so Appalachians at Randolph, was to continue on down through Crawford Notch to Glen Station, where the rest of us were to board it.

We started up Pinkham Notch on our snowshoes at eight o'clock. The sun was shining brightly and the atmosphere was absolutely clear. We had splendid views of the ravines, ridges, cone and summit of Mt. Washington and of the neighboring peaks. The sky behind the range was a clear, deep blue. So absorbed did we become in the scenery that before we knew it the morning had gone and we were in Jackson, where we had an excellent dinner at Nestlenook. After dinner most of us rode to the station, while a few walked in order to increase their week's mileage.

At the station we found 150 A.M.C. people who had been spending the week at the Iron Mountain House in Jackson, among them many friends. Our Glen House party had half of one car reserved for us and we had a jolly trip to Boston, talking over the past week, hearing the reports of the historians, singing our songs, and visiting and being visited by members of other parties.

In the early evening we found ourselves dismounting from the train into the smoky, oppressive air of the North Station. We were soon swallowed up by the crowd and were once more a part of the busy, civilized, everyday world. But perhaps we were a better part than before we went northward, for we had been to the mountaintops, and what soul can ever visit the mountaintops without acquiring some permanent good?

SUPPLEMENTARY NOTE BY EDITOR

Through the kindness of Marjorie Hurd there has been placed at our disposal a copy of the "Log of the Good Ship *Bemis*, Glen House, February 15-24, 1924", a mimeographed record of the trip supplied as a memento to each of the members. From this we take the following interesting statistics.

During the nine days of the excursion the top man, John W. Van de Water, walked $113\frac{3}{4}$ miles (an average of almost 13 a day) and climbed a total of 26,800 feet, or the height from sea-level of an 8000-meter Himalayan peak. Right on his heels was Ruth Langmuir (now Mrs. Van de Water), with the same mileage and a climbing total of 26,600 feet. The average achievement, for those 26 members of the party who were present the full nine days, was $93\frac{1}{2}$ miles walked and 20,100 feet climbed, or a little less than the height of Mt. McKinley above sea-level. The figures for only three members fell below 75 miles walked and 17,000 feet climbed. For a sustained performance by a party of considerable size throughout a long week's excursion, this record has very

likely not been exceeded in the annals of White Mountain winter climbing—unless perhaps upon some other early Bemis Crew trip?

On Sunday, February 16, 1924, 29 members of the party, or all but one of those present at the time, made the summit of Mt. Washington by the Carriage Road. There has been one other recorded occasion when a group, larger by a very narrow margin, made this climb (see APPALACHIA XXX, 1954-5, p. 412); but of the 30 who then reached the top only 19 were properly members of the organized A.M.C. excursion which managed the trip, and they were a modest percentage of their own total party.

Willard Helburn, founder of the Bemis Crew and Chairman of its Equipment Committee for the Glen House trip, wrote some equipment notes for the benefit of new members, which were sent around beforehand. From these we take the following paragraphs.

"Glen House trips are all aimed at headwalls or at the Presidential Range above timberline. Hard crust, ice, rocks, and exposure to high wind are certainties. Admiral Peary said that he found conditions on Mt. Washington in February worse than the Arctic. He equipped himself with a safety-pin, with which he fastened up his coat collar at the summit. Can any of us afford to do less? . . .

"An ice-axe is a pretty toy. It looks professional in the snapshots, serves to hook around the next tree on a steep woods-path, and is no heavier or more trouble on the trail than a loaded shotgun. However, I should as soon be in mid-ocean without a boat as on the headwall of Tuckerman's without an ice-axe. Some of the notorious Bemis picks will be along for those who can't beg, borrow or steal ice-axes, but the axe is the lesser evil.

"Stout, short, flat-toed snowshoes with coarse mesh and snowshoe creepers permanently laced on. Accept no substitute. If you aren't an expert, consult one when buying a new pair. No, the salesman is not an expert. He once saw a [Howard Chandler] Christy illustration of a Rex Beach hero mushing over the tundra on what looked like webbed skis, but this education does not qualify him. . . .

"Bring your skis. The Mt. Washington Carriage Road is the best ski run in the East. [This was in 1924.—Ed.] Either you'll have some fun or the spectators will."

LONGS PEAK BY NIGHT

by RICHARD FLECK

ABOUT TEN O'CLOCK in the evening of September 4, 1960, I was awakened by a light rapping on my cabin door. Coming to my senses, I soon realized that the low voice, muffled by the quaking aspen leaves, was that of my friend Dick, announcing that climbing time had arrived. Breakfast was to be atop 14,256-foot Longs Peak. Quickly I grabbed a can of Swedish meatballs and some chocolate, and off we went to pick up three other Rocky Mountain National Park rangers and then start out on our night climb of the highest peak in northern Colorado.

We were looking forward to observing the northern lights during the total eclipse of the moon which was to occur at three o'clock that night, to seeing the sunrise over the prairies the next morning and to photographing with camera and mind the beauty of the Front Range. At 10.30 we arrived at Longs Peak Campground, at an altitude of about 9200 feet. As we signed the register at the beginning of the trail we were spell-bound by the deep stillness of the air. We began our plodding along the winding trail leading to the summit, eight miles distant. At first our breathing was very heavy, and the quiet night atmosphere accentuated these human sounds. But our lungs gradually grew accustomed to the task, and we were able to enjoy not only the invigorating lodgepole-pine air, but to carry on a five-way conversation. The higher we moved along this winding trail, the cooler became the air. The very sound of the rushing alpine brook, which tumbled over the rocks beside our trail, made me shiver. After we had covered the first four miles and gained two thousand feet in altitude, we sat down by a small waterfall to rest and to put on some warmer clothing. The bright, full moon glowed through the creaking branches of the Englemann spruce and the silvery-barked subalpine fir. At this altitude of 11,200 feet the air was no longer still; chilling breezes swept down off the lofty peaks far above, concealed by the dense timber.

From here we should go at an easy pace, and the next rest stop would be at the Boulder Field (12,600 ft.) where the walk ends and the climb begins. As we approached timberline—perhaps the most fascinating ecological area in the Rockies—the massive granite summits of Mt. Meeker (13,911 ft.) and Longs Peak loomed above us with primeval stillness. The gnarled, twisted limber pine, the crinkly monument plant and the dwarf mountain

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willow shrubs gave an impression of unreality. We were all entranced by the twinkling, fairy-like quality of the town lights on the prairie far below to the east. The timber became scarce as we trekked steadily onward toward the Boulder Field. Dense, matted tundra coated the rocky soil, giving the night landscape the appearance of a giant, ruffled carpet.

At about 1.30 a.m. we reached the beginning of the Boulder Field nestled at the very base of the huge, block-like Longs Peak. As we staggered over loose rocks, I could not help feeling as though we were tiny crustaceans at the bottom of an immense lagoon. The peak itself was flanked by horizontal strips of icy snow which glowed in the rays of the moonlight.

While resting on a huge boulder, we realized that we were to face an awkward situation. Somewhere on the wall of that granite peak our climbing would be hindered by the extinguishing of our only sufficient source of light, the moon. The total eclipse was to occur around 3 a.m. and it would surely take us until four to reach the summit. We hoped we should first be able to get past the hundred or so yards of cable which help the climber up a very sheer part of the north face. On went our gloves and we plodded upward toward Chasm View, some 13,200 feet high. At thirteen thousand feet, breathing can be a bit of a problem; our heads became drowsy and our feet just did not seem to function properly. It seemed as if sheer mental rather than physical power pushed us on toward Chasm View.

The awesome view of the famed Diamond Face and the black waters of Chasm Lake, some two thousand feet below, made us think that even a bighorn sheep would suffer vertigo! We stared at the mysteriously alluring beauty below until we were snapped out of our trance by a suggestion to push onward toward the summit. Just as we were about to arrive at the point where the cable begins the moon slowly disappeared. Now only the stars glimmered above us with the dark, cold rock serving as a frame. Suddenly a shout, "Look to the north!" Way up toward the Wyoming line we saw, low in the sky, the shimmering, pulsating threads of the northern lights. The dim outline of the crags and notches of the Front Range made me feel that the reason the moon was no longer up in the sky was that we were on it.

We missed the cable. In spite of searching for what seemed an eternity in the pitch blackness (save for the dim glimmer of the northern lights and an inadequate flashlight) we failed to find our iron guide. We wormed our way up a narrow chimney in the cliff and after much struggle reached the top. At last, the cable! We unfortunately had taken the most difficult route to the beginning of the cable which now lay before us leading up-

ward over the dark granite. Some crusty, treacherous snow which we encountered succeeded in tiring us a great deal.

When we reached an altitude of about 14,000 feet we decided to rest once again before the last stretch. A faint and pale light to the east blended with the inky sky above us. The town lights on the prairie far below seemed to be the universe in microcosm. When a rosy finch flicked past my head, my mind once again went into gear after idling over beauty, and I shouted, "Two hundred feet to go!" We all started scrambling upward again and by 4.30 a.m. reached the small peneplain summit of the peak.

Since neither food nor drink attracted us so much as sleep we all stretched out, each on his own flat-topped boulder. But only some fifteen minutes passed before we were awakened by the chattering of our teeth. By this time a faint reddish hue was visible in the frosty air. The dull-green, lake-studded prairie gradually assumed a more realistic appearance. As the sun bobbed up over the rim of the earth we all squinted like bats at midday. The whole Front Range was caught in a golden glow, while the narrow valleys far below remained dim and gray. The broad snowfields of the Arapahoe Range to the south sparkled in the crisp morning air. Only then did we realize the inadequacy of cameras. Perhaps the most inspiring phenomenon occurred when the vast, block-shaped shadow of Longs Peak stretched out some sixty miles to the west.

We enjoyed our sunrise breakfast. Even soggy, cold Swedish meatballs, at 14,256 feet, seemed like a gourmet's delight. To our surprise, Longs Peak's solitary hoary marmot made his appearance and begged for food. This clownish creature seemed unsuited to such a milieu.

The descent to the Boulder Field proved rewarding. Each foot of the granite peak appeared as would Pennsylvania Dutch farm country from the air—that is, a patchwork of vegetational designs. Orange, yellow, black and green crusty lichens with dense patches of Irish-green moss and brownish-black liverwort encrusted the cliffsides all the way down to Chasm View. The charm of this color scheme overpowered the tired pain of our legs and feet.

With the pipits and rosy finches flying about our heads while we rested at the Boulder Field, we five knew that the peak had been realized, and that there was left a mere six-mile downhill trek to the campground. The roaring alpine brook beside the trail no longer had an icy effect but offered a welcome relief from the warm rays of the Indian Summer sun. After hours of the scent of baking pine needles we finally emerged from the dense forest into the campground clearing. In our homeward-bound vehicle, we sang both aloud and silently.

THE LOGGING RAILROADS OF THE WHITE MOUNTAINS

by C. FRANCIS BELCHER

PART IV: THE ZEALAND VALLEY RAILROAD (1884-1897)

THE CROWDED EVENTS of an exciting saga once unrolled in the valley of the shallow, churning stream which empties into the Ammonoosuc River just west of the U.S. Forest Service campground in the town of Carroll, Coös County, New Hampshire. Though the record of these events has now been dimmed by scorching fires, dust and flood, and by the passing of time, it is yet a memorable saga.

The scene of this saga of long ago, the Zealand River valley, has experienced amazing natural changes over the past forty years. Where, not so far back, the seven miles from the campground to Zealand Notch at the head of the valley made a hot, dry summer walk, today it is a shady, cool refreshing trip into a spruce-tipped basin, filled with stretching trees, a basin which increasingly serves its visitors and neighbors in manifold ways. Zealand's waters, once thought quenched for good by the destruction of the forest cover, refresh the throats of so many—the Zealand River being the source of Bethlehem's water supply—and also have an industrial importance indirectly, that is, when they become merged with those of the Ammonoosuc and the Connecticut. The Zealand valley is now the center of the lynx population of New Hampshire, harbors increasingly active beaver colonies, and in season plays host to unexpectedly large and varied flocks of song birds.

Yet the Zealand valley has been described within this century by an eminent forester, Thomas Will, as "Death valley . . . a scene never to be forgotten . . . on every hand masses of white stone scattered in utter confusion . . . disinterred skeletons of trees, stumps and roots . . . nothing but bald, bleak rocks". And in an editorial entitled "The Trail of the Sawmill" the *Boston Transcript* of Wednesday, July 20, 1892, had this to say of the area:

The beautiful Zealand Valley is one vast scene of waste and desolation; immense heaps of sawdust roll down the slopes to choke the stream and, by the destructive acids distilled from their decaying substance, to poison the fish; smoke rises night and day from fires which are maintained to destroy the still accumulating piles of slabs and other mill debris.

Parts I, II and III of this article appeared in *APPALACHIA* for December 1959, June 1960 and December 1960.

The Zealand valley, originally called the New Zealand valley, was the key to the opening of the treasure chest of the Pemigewasset wilderness. It was the stage for the first act in the flowering of the greatest of New Hampshire's lumber barons, James Everell Henry. Here in the heartland of the White Mountains, on the largest single forest tract to be controlled by one man or one family, "J.E." was to find his destiny in over 100,000 acres of the Granite State's very richest, untouched spruce and fir. For better, for worse, in the true tradition of a free-wheeling age, here could have been seen a real craftsman plying his trade. J.E. was to put together the business of harvesting trees and that of operating lumber railroads with such devastating efficiency as would never be equalled in the White Mountains.

Before we take a more intimate look at James E. Henry, or get into the story of his first venture in the operation of a lumber railroad, let's see what the Pemigewasset and Zealand areas were like in their pristine state. In 1876 Moses F. Sweetser wrote the first comprehensive guidebook to the White Mountains and their deep reaches. It contained the following lines about these areas:

The inner solitudes should be entered only under the guidance of experienced foresters; and travelling will be found very slow and arduous. The scenery is simply that of a vast primeval forest, most of the environing mountains being hidden by the foliage and by intervening ridges. Trout increase and multiply almost undisturbed in the brooks and ponds.

An extensive story about a trip through the Zealand wilds appeared in the August 23, 1879, issue of *The White Mountain Echo*, a summer weekly published in Bethlehem, N. H. The story was entitled "Echo Explorations, Part 2" and it concerned a journey taken in the early summer of that year by a famed local guide, Allen ("Old Man") Thompson and the author, Benjamin A. MacDonald, from Twin Mountain through New Zealand Notch and out to Crawford Notch by way of Ethan Pond. This story makes absolutely no mention of any logging in the area and speaks of it frequently as an "unbroken wilderness". It refers to their route as "pathless . . . following old deer paths . . . over fallen stumps of giant trees . . . through swamps . . . and into brooks". Today, some eighty years later, one section of MacDonald's long chronicle is noteworthy:

New Zealand Notch really lies between Mt. Thompson [named by this party for the intrepid guide, but now called Zeacliff] on the west and Mt. Hastings [named by them for a deceased friend and former Bethlehem railroad engineer, now known as Whitewall Mountain] on the east and runs almost directly north and south. It is variable in width, its greatest span being at its south outlet, where it is over 400 feet, while at its narrowest portion it is from 300 to 350 feet.

There are two outlets to New Zealand Pond, one running north and the other south.

The Notch extends from the beginning of the south outlet of the Pond to its junction with the Pemigewasset, a distance of about three miles. There is a natural shelf-like road bed for a railroad bed throughout the entire pass varying from twenty-five to thirty feet in width. There are occasional small ravines, but none that could not be easily bridged over. As Thompson assured me—and I must say from what I saw the old man's judgment seemed correct, "A railroad could easily be constructed clear through from Sawyer's River to the Ammonoosuc by way of this Notch".

The path, too, is through some of the finest timber lands in the country, mostly spruce, but varied with white and yellow birch. . . .

The scenery along the route is simply grand. The Notch, formed by the two mountains I have mentioned before, is superb. . . .

It must not be supposed, however, that because I have thus briefly and summarily disposed of the Notch that it is as easy of access to the visitor as these few lines on paper would indicate. Nothing but the primeval forests surround him from the entrance to the exit. Thick, tangled brush impedes his every step; enormous trees, green with moss that has formed upon them for years, lie in his path in every direction.

It is evident that in 1876 and 1879 much of this area was little known and virtually unmarked by signs of human life. Only a few intrepid persons such as Sweetser, Thompson and MacDonald, and the hunters, fishermen and guides living about its edges knew much about its secrets. But time was running out for "The Pemi". By 1880 J. E. Henry had its key and was ready to open the chest. The saga of Zealand and the Pemigewasset for the next twenty years was to be a tumultuous one, centered on lumbering by means of two mountain railroads owned and controlled by an expert and his well-trained sons. Moss-covered trees which had waited for centuries were to fall fast.

JAMES EVERELL HENRY (1831-1912)

In the foreword to his book, *The Age of Moguls*,¹ Stewart H. Holbrook makes a number of pertinent statements which will help in understanding the times in which J. E. Henry of Lyman, N. H., lived.

The men in this book have been described variously during a century as giants and Titans, and more often as rogues, robbers, and rascals, but never as feeble. The least of them had a splendid audacity and a vital energy that erupted in astonishing ways.

They had certain traits in common. They have usually been treated as a class. Yet all were men of devout and adamant individualism, hence differed from the mass of their fellow Americans. Each had an overpowering sense of acquisitiveness. None subscribed to the dogmas of the philosophers which deal with what ought to be, but held

¹ Doubleday, 1953.

stoutly to the proposition that what is and shall be is determined by the *forces at work*. That they understood the forces at work must be clear from their accomplishments.

These were tough-minded fellows, who fought their way encased in rhinoceros hides and filled the air with their mad bellowings and the cries of the wounded.

Regardless of superficial post mortems of this "Age of Moguls", these men and their age molded the strength of America to what we know today. They were a vital link in America's growth from adolescence to maturity. And in this, his age, James Everell Henry played a leading role in the White Mountains.

In his lifetime Henry was called in print many derogatory names: "King Contractor of the Mountains", "Lumber King", "Heartless Lumber King", "Wood Butcher", "Mutilator of Nature", "Timber Baron"² and "Grand Duke of Lincoln", to name a few. Likewise his lumbering methods and their results were recorded in numerous public journals as "wood butchery", "havoc", "object of not the most pleasing character", "abomination of desolation", "one vast scene of waste and desolation" and "great blemish of a devastated forest".

On the more intimate level James E. Henry was known in his early days by close friends as "Ave". This appears to have been a name of unknown origin in use in his Zealand or earlier days and by those who had known him around Littleton, N. H. Actually I have seen this nickname in print in only two places (*A Treasury of New England Folklore*,³ p. 576 ff. and *Spiked Boots*,⁴ p. 121). The name by which he earned his logging laurels, the one by which he is known to his descendants, and the one which appears countless times in print is "J.E."

J.E.'s boyhood experiences apparently framed the stern and positive character of his later years. Ernest Russell in an extensive article in *Collier's*⁵ gives the background of these boyhood experiences:

He looks back on a boyhood of bitter poverty, scanty meals and hardest labor. He remembers yet the taunts of other lads who stepped on his bare toes, blue and cracked with cold. . . . "I fought and licked 'em when I could," he says, "and when I couldn't, I set my teeth and said, 'You h'ain't agoin' again to step on my toes always,' 'an, by God, they h'ain't."

² Stewart H. Holbrook, in *Holy Old Mackinaw* (Macmillan, 1936) described the Timber Barons of this period as "public ogres who fairly sweated destruction from every pore and who ate up everything but the sawdust which they left in unsightly piles . . . a notable figure in American demonology—complete with peaveys for horns, and the tail a long, curling ribbon of band-saw".

³ Bernard L. Bodkin, ed. *A Treasury of New England Folklore*, 1946.

⁴ Robert E. Pike. *Spiked Boots*. Private printing, Cowles Press, St. Johnsbury, Vt., 1959.

⁵ Ernest Russell. "Wood Butchers." *Collier's*, March 1908.



PORTRAIT OF J. E. HENRY

About 1880, in his Fifties



J. E. HENRY ON JIGGER CAR

At Lincoln, about 1906



ON THE ZEALAND VALLEY R.R. ABOUT 1880

Jim Henry's instincts were the primitive instincts of the fighter—but he had brains—and he has mixed them with his fighting just as he has mixed them with his bartering and his money making.

A further quotation from a different source adds confirmation on this period in Henry's life. His obituary which appeared in the May 1912 issue of the *Granite Monthly* mentions that his parents, Joseph and Mary Calhoun Henry of Lyman, N. H., were poor; that their son had to earn his way at the age of fifteen by driving freight teams between Concord and Franklin, N. H., and Portland, Maine, and Montpelier, Vt., for a period of five years. Such rugged duty was a fitting apprenticeship for the many, rugged years ahead in equally rugged mountain country. And an early knowledge and appreciation of horses was to show itself in many unique ways in later years as well.

In April 1853 J.E. married a patient native of Waterford, Vt., Eliza M. Ide. She bore him in subsequent years two daughters (later residents of Minnesota) and three sons, John H., George E. and Charles B., all three of whom were partners in the coming Zealand and Lincoln logging operations. The first twenty years after their marriage involved much moving for the Henrys, a number of homes, speculations won, others lost, bitter experiences in Tintah, Minnesota, and an ultimate realization by J.E. that land and logs were his specialty and the White Mountains of New Hampshire his country.

The record of land sales and purchases in the Grafton County Registry of Deeds indicates that Henry's return to the Granite State's lumber wars came about in 1869. There were multiple land purchases in his early firm name of Henry, Joy and Baldwin of Woodsville, N. H., in the Bath area between 1869 and 1879, and about Haverhill in the period from 1871 to 1883. His associates in these days were Charles Joy of Haverhill, N. H., and Alvi T. Baldwin of Newbury, Vt. Henry's home at this time was close by the firm's sawmill in Haverhill. This operation was a mere tune-up for the big jump to the virgin spruce on the great plateau surrounding Fabyan.

Written records are quite conflicting as to when J.E. and his partners went into the Fabyan-Zealand area. The dates given run all the way from 1874, in Russell's story in *Collier's*, to 1888, in Ernest Poole's *Great White Hills* (Doubleday, 1946). That the truth is somewhere in between is borne out by the fact that the first record at the Grafton County Registry office, in Book 362, p. 305, of any land purchases in that area by the Henry firm is on April 20, 1880. These purchases, covering several thousands of acres in Carroll, Bethlehem, and in adjacent grants and purchases cost the firm \$33,000. Less than a year later Henry and Baldwin bought out Joy for \$25,000, and less than another year later J.E. bought out Baldwin's remaining interest for \$35,000. Bodkin's

Treasury of New England Folklore contains an interesting tale about this period:

"Ave" Henry, as he was always called, bought out a sawmill at Zealand (just above Twin Mountain village) with two other men as partners, but soon bought them out. They are reported to have logged much of the Zealand country before they purchased it and then paid only a nominal sum for the land.

Cutting in the primeval plots about Fabyan and Zealand must have been quick and rewarding for Henry. And from this time forth the name of Henry was to be unencumbered with non-family partners. Harken to the words of Ernest Russell in his *Collier's* article:

Whenever . . . he turns to timber, everything comes his way. He works best when unrestrained by partners or agents. . . . All his life he had dominated everything and everybody that touched his activities . . . and the loggers tell the story.

In the next thirty years J.E., his three sons, and their many hired hands from Zealand and Lincoln, N. H., were to record the biggest logging story of the White Mountains.

The actual beginning of big operations at Zealand is obscure. Russell states that it was in 1881. He is probably correct, for much of his article was based on interviews with the Henrys, father and sons. For three or four years all cuttings were on the lower elevations of Crawford's Purchase and Nash and Sawyer Location (to the east of Zealand), along the tracks of the Mt. Washington Branch of the Boston & Lowell R.R. The logs were hauled by agreement to Henry's Fabyan and Zealand Mills. A small article in the August 11, 1882, issue of *Among The Clouds* adds confirmation to this:

Many people wonder what becomes of the Mt. Washington Branch of the . . . R.R. in winter. Superintendent Corning solves the problem by the information that last year 70 million feet of lumber were drawn over the road. During summer months the lumber men give way to the traveling public, but for the remaining nine they furnish much of the business of the road.

In the period from 1881 until his death in 1912 J.E. went from the foot to the head of the logging class. With the possible exception of George Van Dyke with his vast Pittsburg holdings, Henry became the largest landowner in the state of New Hampshire. It is doubtful whether any lumberman of that or any other day ever operated more miles of New England lumber railroads in his tree harvest. Henry's operations were to mean the start and finish of one village, Zealand (1881-1904), and the renaissance, under complete political domination, of another, Lincoln (1892-1912). Above all, J.E. and his sons were to sharpen the axe of mountain clear-cutting to such a fine edge that their handiwork

will be visible all over the Zealand and East Branch basins for years to come. Why no landmark in this extensive mountain country bears their name remains a good question. This was their country.

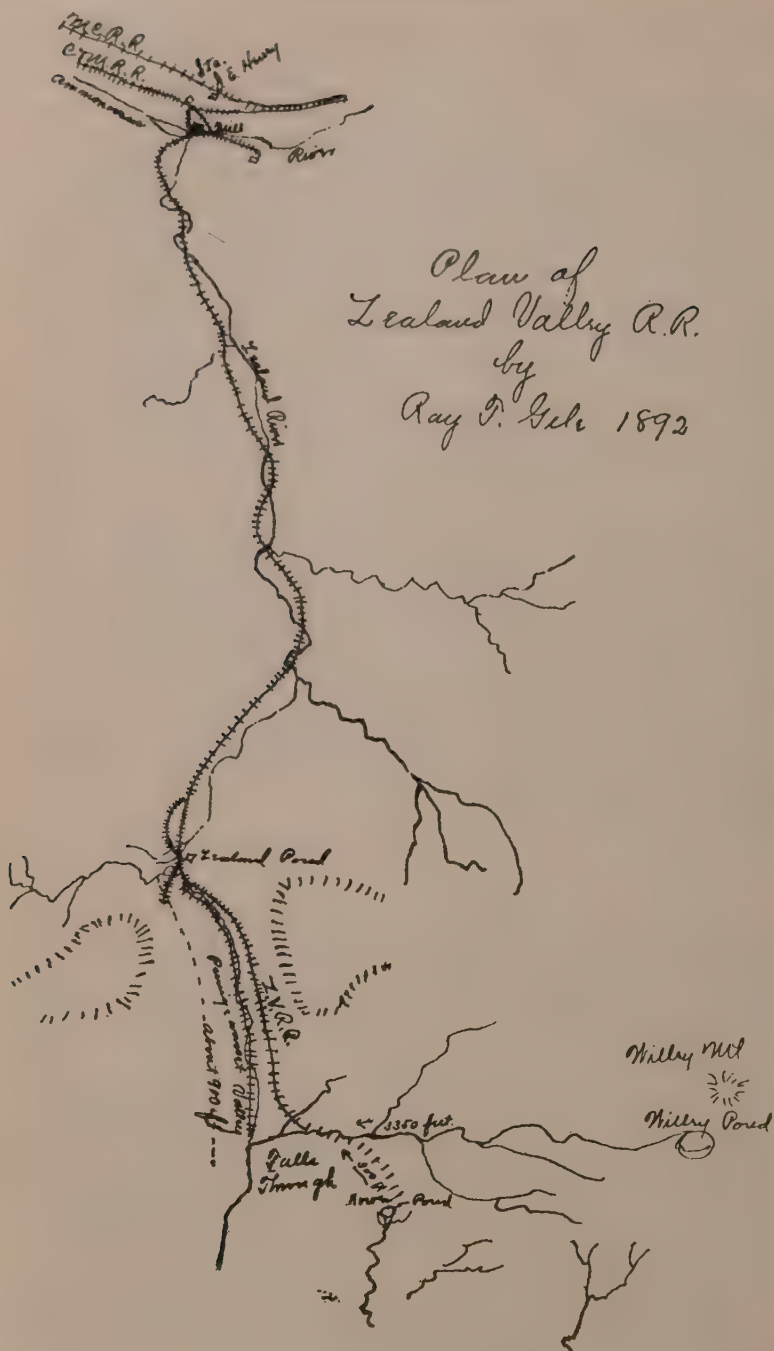
Many have been the stories told about Henry. Why not, when "J. E. Henry is undoubtedly the most colorful character that northern New Hampshire has ever produced", as Bodkin reports in *A Treasury of New England Folklore*. This compendium of legends contains a number about "Ave"; many more are found in other articles of his day or later; and far more can be heard in the Lincoln area from the decreasing number of men who once worked for J. E. Henry and Sons Co., or from relatives of such workers. It is easy to deduce that J.E. was a shrewd trader and a hard bargainer, that he loved a horse and valued its life almost as much as that of a man, that he was a strict disciplinarian and driver of men, an amazingly successful and keen businessman, and "as charitable as it is possible for men to be who are more concerned with the difficult art of getting than with any other human activity or interest".⁶ These were some of his stronger traits about which many stories have been told. About his "charity" we should like to add that in 1901 he deeded an eighth of an acre of land in Lincoln to the A.M.C.—for \$200—and further required that "no liquor shall be sold upon the premises while in its possession"! Among other things he was dead set against the use of alcohol or tobacco, particularly in his town. What went on over the line in the next town was someone else's business and responsibility.

ZEALAND VALLEY R.R.

Two years before the Zealand lands had passed into Henry's hands, the New Hampshire Legislature passed an act to incorporate the New Zealand Valley R.R., a dream line behind which stood the interests of big-time railroaders. These interests, precursors of the B. & M. (the Boston, Concord & Montreal and the Boston & Lowell), were looking for, and never found, a more direct route than the existing one via Woodsville from the Concord, N. H. area to the great vacation attractions in the Twin Mountain, Fabyan and Crawford Notch region. In this act the incorporators were authorized to extend and maintain a line south up the New Zealand River, with rights to connect with any other line in the state. They had much room in which to move—and never did.

This specter of a competitor in his domain never outwardly bothered "Ave". Instead, he was to play the big city railroaders

⁶ Ernest Russell, *loc. cit.*



and financiers for many advantageous trades in the coming years. Always he had the bait of his rail line and its tremendous carloads of lumber. Extensions of time were granted to this New Zealand Valley R.R. by the Legislature in 1881, to 1887; in 1887, to 1895; and in 1891, to 1906. By the last date civil engineers for the big interests had learned that a shorter, inside route to the heart of vacationland was too costly and hence inexpedient.

With the version appearing in *A Treasury of New England Folklore* as to how the rails of Henry's first railroad were procured we must disagree. The actual facts are the subject of an official written record. Bodkin's version reads:

When he decided to put in a log railroad seven miles in length, he ordered the rails to be delivered at a certain time in early summer. The rails failed to arrive, but he had engaged a large crew to lay them and so set the crew to work in the woods. When the rails arrived, he sued the company for not getting them there in time and finally got \$50,000 damages plus the rails for nothing. In the meantime the crew had piled up a great many logs beside the track while they were supposedly idle waiting for the rails.

This account is characteristic of how facts and fancy together grow into legend. But it fails to identify the company supplying the rails or the court in which Henry received his tremendous judgment. The actual facts are that the construction of the line was begun in 1884. Ten miles of rail and much miscellaneous track equipment were supplied to J. E. Henry & Sons Co. by the Boston & Lowell R.R. at a total cost of \$25,448.89. Most of the business arrangements surrounding this large transaction were a very small part of a much broader suit of historical record between the then-existing major rail interests in New Hampshire. We should like to submit here the evidence of one Myron Taylor, a railroad accountant, who testified under oath as follows in this suit about the Zealand-Henry transactions:

There was an exact survey of the road made later on, and it was ascertained that the rails had been sent to the road [Zealand Valley R.R.], which had not been reported to me, and the result was that when we made the final corrected amount (\$25,448.89), it was made upon figures in the statement you have, which is the actual amount expended. [Those items were] actually paid, and supplies furnished.⁷

This rail-and-track-equipment purchase was part of a series of shrewd trades between Henry and these two railroads which were finally formalized on November 2, 1885, by a deed calling for the construction of 2½ miles of sidetracks and 10 miles of branch track south from Zealand Village, part of which had already been constructed. (Grafton County Registry of Deeds, Book

⁷ Boston, Concord & Montreal R.R. vs. Boston & Lowell R.R., N.H. Supreme Court, June 1889.

392, p. 342.) In 1892 a formal quitclaim deed from Henry to the Boston, Concord & Montreal R.R., by that time lessee of the Boston & Lowell R.R., gave the B., C. & M. the right of way of the Zealand Valley R.R. all the way from Zealand Station to Howe's [Shoal] Pond in Livermore. This rail company never exercised their rights under this deed. The plans that appear with this article are copies of those filed with the Registry of Deeds to accompany the last-mentioned instrument. In retrospect it would be interesting to know how much of these tracks and rail equipment was to live through Ave Henry's lifetime and to be used on his line out of Lincoln.

Here then was a New Zealand Valley line up and down which Henry's logging trains started twisting and clanking in 1884. But why did the name suddenly and without apparent explanation become the plain "Zealand" we know today? According to the eminent White Mountain bibliographer, Frank H. Burt, in an article, "Nomenclature of the White Mountains" (APPALACHIA, December 1915, pp. 359-390), the name "New Zealand" first appeared on Walling's map of Coös County in 1877. He also lists the fact that "Zealand" first appeared on Professor Hitchcock's map of the mountains at about the same time. There is no clear explanation of the origin of either of these names, unusual for the White Mountains. Burt offers the clearest comment on why the "New" was dropped from latter-day White Mountain nomenclature ("New Zealand," *Among The Clouds*, July 12, 1888, p. 4):

Whence the name of this lonely valley—so incongruous among mountain nomenclature—no man knoweth. It was probably bestowed in fun many years ago, and it has survived to be officially recognized. *The railroad and the post office department shortened it to Zealand [my italics].*

The late former Chief Train Dispatcher "P.Y." Learned (referred to in Part II of this series under the "Little River Railroad") started his long railroad career as ticket agent and operator at Zealand depot in the middle 1890s. On the matter of this shift of name he once told me that neither the operating railroads nor the U.S. post office department ever recognized anything but "Zealand" for the station and village. The many timetable and newspaper listings of that era also never referred to it as anything other than plain "Zealand". By 1890 the "New" had entirely disappeared from the name.

As can be seen from the sketch appearing with this article, there was a sizable area of tracks, interchanges and buildings at Zealand. The village, of which nothing remains today, was a short distance west of the present campground. The owner's and workers' homes were north of the present Route 302, on the hillside against the Maine Central R.R. location. The mill was

next to the river, between it and the present highway. For those days the place was a sizable, if unattractive, logging town, one that boasted, in addition to the already mentioned houses and mill, a post office, company store, school, some car shops, the ever-present charcoal kilns, and the depot at which, in the summer of 1893, five trains daily in each direction on the Concord



& Montreal R.R. were required to stop on their runs between Bethlehem Junction and Fabyan. The depot was first built in 1885, and a better, more commodious one replaced it in 1893. At one time, like Hastings and Carrigain (in Crawford Notch, above Notchland), Zealand was a small but vigorous part of the White Mountain scene. Unlike Livermore it was never a township of its own, but was always to remain the much-criticized east end of the town of Carroll.

The sketch of the main line of the Zealand Valley R.R. reveals some deviations from today's popular conception of where the

tracks ran. Quite obviously the course of the Zealand River has changed since 1892, doubtless due to the many high waters which later swept this valley as well as to the gradual forces of erosion. In the Notch area there were a number of branch lines or side-tracks, some of which it would be hard, if not impossible, to trace today. The lower line following Whitewall Brook apparently was intended as the link—never completed—to Lincoln and civilization on the south.

I have never been able to locate accurately the various lumber camps which were established as the Henry line moved into the woods. Stories referred to in this article and others not mentioned have named Camps 1, 2, 3, 4 (this last was known as "Tintah Station", from Henry's great Minnesota farm of earlier years), 5 and 6. Unfortunately the signs of their specific locations have not survived the passage of time, nor were they shown on official maps. There are written references to other camps in this valley, and one at the north end of Zealand Pond was mentioned by J. M. Cooper in a story about New Zealand Notch in the March 1898 issue of the *Granite Monthly*; he calls it "one of the large lumber camps with which the line of travel is dotted". In the present beaver swamp northeast of the junction of the A-Z and Zealand Trails some twenty years ago the ground was dry and bore evidence of a sizable railroad yard and terminus.

Two articles written during the period of the Henry operations in Zealand give vivid descriptions, worth comparing, of the rail line itself. Frank H. Burt in the article previously referred to in the July 12, 1888, issue of *Among The Clouds* says:

The Zealand Valley R.R. is the crookedest and, with one exception, the steepest road in New England. Its sharpest grade is 285 feet to the mile, 15 feet less than the maximum grade between Fabyans and The Base. How many crooks and turns there are in its length of five miles, or how many times it crosses the equally crooked river, we dare not guess. . . . The zig-zags of the track become more marked. "When they built the road," Mr. Henry [son John] tells us, "they said they would straighten the track the next year; but they soon said that instead of taking out any curves, they would rather put in a few more, they are such a help in holding a heavy train when going down grade."

J. M. Cooper, in the *Granite Monthly* article already mentioned, was reporting on a trip taken several years (date not specified) after Burt's trip of 1887. By that time the rail line was through the Notch to the south. He mentions the length of the line as being eleven miles. According to Cooper his train was the first passenger extra ever run over the railroad. The picture of the train on the trestle with one of the Sugarloaf peaks in the background, which is reproduced with this article, also appears

with the Cooper story. He too had an unusual ride. "Up and up [the train] crawled until in some places the grade reached 285 feet to the mile; round and round, in a tortuous way, it wound through the valley, its passage recalling the trail of a snake."

There are few if any memories or records that agree on the extent of the Henry operation on their Zealand frontier. Unlike the situation in their later Lincoln days, lumbering efficiency on this job was something that the Henrys and their hired hands were learning as they pushed the cuttings here and there but always farther into the forest. The exhaustive Chittenden Report of 1904 (referred to in Parts I and III of this series of articles) mentions on pages 78 and 82 that Henry in this Zealand era showed somewhat conservative leanings and "lumbered for spruce sawlogs only, no trees under 10 inches on the stumps being taken". His later zeal for clear-cutting may have come from the experience of seeing the violent and costly forest fire of 1886 consume what he had conservatively left on these stumps under 10 inches.

One certain fact is that the Zealand Valley R.R. did not support as many hands in the woods, operators in the Zealand mill, or dependents in the woods and village as were to be maintained later in Lincoln by both a sawmill and pulpmill together. After all, the Henrys were just learning. Chronicles of this operation do agree that in the summertime J. E. Henry and Sons Co. employed crews of 80 and in the winter of 250 or more. In the woods they depended on Frenchmen and polyglot imports from Bangor, the wharves of Boston, or the noted second-floor agencies of Scollay Square. In the Zealand operation, on a year-round basis, J.E. was proceeding to build up a hard core of loyal workers such as the many and able Boyles, Jim Ward, Jim Doherty and others. All were going to contribute in great measure to the success of future "skinnings" out of Henry's Lincoln operations. "Bark was starting to get in their hair."⁸ The scrimmages were about over and the big games were coming up.

THE ZEALAND CAMPS AND CHOPPERS

In his later years J.E. was to be noted for his clean rights of way and his efficient, reasonably-livable logging camps. On the early Zealand line he was still gaining experience. Witness the following description of one of the Zealand logging camps and its choppers, written by Frank H. Burt in 1888:

Camp 1 is the first stopping place, and it is a model of other camps above. A primitive log cabin for woodchoppers and a log stable nearby for the horses are the whole settlement saving a "squatters"

⁸ Trade lingo for "becoming experienced loggers".

hut nearby, where dwells a lone woodchopper with his five children. Here a gang of men are hauling cordwood, and we note with interest the strange vehicles used for the purpose and the surprising agility of the horses.

Camp 4, the present end of the road, is reached all too soon. Every moment of the ride has been full of interest. Leaving our "faithful steed", we enter the lumbermen's home. This log cabin bears the sign "Tintah Station", a name borrowed from Mr. Henry's great farm in Minnesota. The cabin is divided into 2 rooms: the outermost is the kitchen and diningroom, the inner room the sleeping quarters for the 30-odd men of this camp. A log table and benches made of hewn logs complete the furnishings. The sleeping room is lined with a double tier of bunks on both sides and has but a single window. The French Canadian woodsmen, living out of doors all day, never complain of the scarcity of fresh air at night; and after all it is no worse than the lower cabin of many a popular coast steamer.

The men are not all illiterate, but about three-quarters of them make their mark. They are usually peaceable, steady fellows, but there is now and then a rough one and strict discipline has to be kept. They are rugged and robust. Sickness is rare, while they are usually fortunate in escaping accidents. They work 11 hours a day and earn about six dollars a week and board.

Strangely enough the rail and construction gangs were Italians, who preferred to share their camp existence with no other races. These laborers lived in separate quarters and ate their own, unique menu in the solitude of the Henry forests. Not only has this feature of life in Zealand survived through personal memory, but it appears also in the written record of J. M. Cooper, previously quoted.

The train pulled up again to give the company a chance to gaze into the small building where over thirty Italians were housed. How they ever lived in such close quarters is inexplicable, but their faces reflected their happiness, and the huge preparation of macaroni that was underway told of the capacity of their appetites. There were comfortable quarters for them in the camps but they preferred to dwell apart from the French Canadians, who, for the most part, compose the crew of wood cutters and teamsters, and enjoy home comfort.

Appalachian Mountain Club hut crews, working in the Zealand Falls Hut since 1930, were not the first to dish up spicy, Neapolitan dishes on the edge of the Pemigewasset wilderness. They have only been following an established local tradition.

THE RAIL OPERATIONS

Few if any written records exist on how logging trains operated on this line. Memories of them are at best secondhand, perhaps even more remote. I have been told by various authoritative sources that the number of locomotives the Henrys used on this line varied all the way from one to four. From the date-spread of the Burt and Cooper stories it is quite obvious that Engine

No. 1, known as *J. E. Henry*, was in use in 1887, as well as several years later in the 1890s. The accompanying pictures show it on duty on the line and near Zealand Village. Fifteen years ago the files of the Boston & Maine Railroad contained reference to a No. 2 engine with no name, as well as agreements for the winter rental by Henry of the Boston & Lowell's engines which were used in summer for the short hill-run between Fabyan and the Base Station. As indicated by the Cooper story, an occasional excursion train ran into the forest, but never on the regular basis of those in later years on the East Branch & Lincoln R.R.

Zealand engines were light ones, 35-tonners, and woodburners. For this last reason they were singled out more than once in official reports as having incendiary tendencies when the woods were dry. The results of this tendency will soon become apparent. Frank H. Burt, in his July 1888 *Among The Clouds* article, adds the following comments on these engines:

The engines are the oddest ever seen in this part of the country. The tank is over the boiler, the weight of the engine is borne on the four drivers, and there is a simple pair of small wheels "fore and aft". The engines can haul 15 empty log cars up the steep grade, and have sometimes brought down 16 loaded cars; though eight is the regular number to a train.

One unusual fact related to me by Frank Boyle of Plymouth, N. H., was that the mileposts on all the Zealand and East Branch lines were measured and fixed, under the supervision of son George E. Henry, by the unique method of counting the revolutions of the engine's driving wheels while the train was in motion. On orders from George, after the proper count, the engine was stopped and the post was set. A later surveyor's check verified that these positions fell short of complete accuracy by less than one-tenth of a mile.

THE ZEALAND FIRES

This trip lay, for the most part, through the Zealand Valley. The writer has surnamed this "Death Valley". Here is a scene which, once witnessed, can never be forgotten. For 18 or 20 years the Henrys and the fires have worked their will on this devoted region. It is of this area, or one near and similar, that the venerable Rev. Edward Everett Hale has exclaimed, "It makes a man cry to see it". Of the mountain named after himself such a declaration might well be made. But if this be true, tears could not do justice to the conditions further up the valley and probably not seen by Dr. Hale.

But for the climax of desolation we must go on. Afar off, on the east side of the valley, we see it. Drawing near, its full meaning is revealed. We have reached "the slides" [Whitewall Mountain]. . . . Axe and fire, however, swept away the last vestige of vegetation and with it, the soil.

In the space of a short walk thirteen of these slides were counted. Occasionally, on a steep declivity and in consequence of heavy rains,

a slide will occur in the untouched forest. Much more will follow deforestation; and the guide, an old resident, declared that every one of these thirteen slides had come since the forests were cut.⁹

Today, however, it is a dull-brown waste of lifeless, fire-eaten soil and stark white boulders. All about lie the great blackened stumps and tangled roots of what were once majestic trees. It is as if the contents of some vast cemetery had been unearthed in that little valley.¹⁰

West of the Rosebrook Range and separating it from Mt. Hale of the Twin Range are Zealand Notch and Zealand River, the latter a branch of the Ammonoosuc. Through the bottom of the valley a lumber railroad leading to Shoal Pond formerly existed. The rail lines have been removed and a succession of forest fires has been destroying everything of an inflammable character, the road-bed being the only evidence left.¹¹

The foregoing are but three samples of what was repeated many times over in print about the Zealand basin in the post-Henry years. By all versions there is solid agreement: after 1903 this valley and its surrounding peaks had been wrecked by man and nature. Since we have already noted that at this stage of his lumbering career J. E. Henry was not the famed clear-cutting operator of his later years, what then were the causes of this wreck? Certainly he himself never knowingly brought about the destruction of the source of his very bread and butter, his own land and forests.

Today fire prevention and fire safety are daily bywords. Advanced and intricate methods of detection and control of forest fires are part of a forester's and woodsman's second nature. The answer to the "Fire Rape of Zealand" lies in the fact that an inexhaustible America knew little about forest-fire prevention seventy years ago; the science of forestry and its sub-science of forest-fire control were in their infancy; and iron horses nurtured on wood, or even coal, were wasteful playthings which shot out exhaust sparks and dropped warm clinkers without discretion.¹² Like their contemporaries in this lumber-railroad business, J. E. Henry and his sons had to learn the lessons of their new devices in the school of searing experience. When and how, then, was the Zealand valley swept by a tidal wave of flame?

Historians and forestry reports have listed the two great Zealand fires as having occurred in the summer of 1888 and the spring of 1903. These also mention other, smaller burns, but

⁹ Editor Thomas Will of the American Forestry Society in an editorial in the September 1907 issue of *Forestry and Irrigation*.

¹⁰ Ernest Russell, *Collier's*, March 1908.

¹¹ *Guide to Paths in the White Mountains*, Appalachian Mountain Club, 1917.

¹² Stewart H. Holbrook in *Holy Old Mackinaw*: "So in all modern logging camps there are fire-prevention measures that would astound an old-time lumberjack whose only idea on the subject was to refrain from knocking live coals out of his pipe in July and August".



LUMBER YARD AT ZEALAND NOTCH, 1891

Courtesy of P. Y. Leaned



A.M.C. Collection

RAVAGES OF THE FOREST FIRE OF 1903
On the Sugarloaf Peaks, Zealand



BALDWIN LOCOMOTIVE "J. E. HENRY"
Of the Zealand Valley R.R.

do not identify their dates and specific areas. These well-known sources are such documents as the *Report of the New Hampshire Forestry Commission* for the years 1901-1902, the extensive survey and report of Alfred K. Chittenden, of the U.S. Forest Service, of 1904 (previously noted), and Kilbourne's famous *Chronicles of the White Mountains* (1916). There are others. But careful and time-consuming research of all available newspapers of the year 1888 revealed no data on unusual events in the White Mountains except for complaining references to a "wet summer". Suddenly, the following paragraph jumped out of the story of the eminent and accurate Frank H. Burt in the July 12, 1888, issue of *Among the Clouds*:

On a beautiful autumnal day in the closing weeks of *the season of 1887*, two representatives of "Among The Clouds" took a trip into the New Zealand Valley. . . . We were kindly given seats on the front of the engine (which backs up the road) and had a fine opportunity to enjoy the pleasant scenery. The lower part of the valley is rather dreary. The spruce has been cut, *and the great fire of 1886 destroyed all that the woodsman had left. On the hillsides in many places, even the soil had yielded to the intense heat and nothing was left but the bare road* [my italics].

This unexpected discovery meant a complete recheck of all possible papers for 1886 as well as those of 1888. Boston journals and even Burt's *Among The Clouds* were of no help in either year. Zealand was deep in the wilderness to most writers, and part of a dirty business, better ignored, to others. Thanks to the English-born editor of the *White Mountain Echo*, Markinfield Addey, the answer to the correct date for the first great Zealand fire appeared on page 8 of the July 10, 1886 (Friday) issue of that summer weekly. The headlines read, "Forest Fire", the sub-headlines, "Great Conflagration in the New Zealand Woods—Reported Loss of Life". The story read as follows:

On Wednesday afternoon (July 8) a fire started in the New Zealand woods, which has caused considerable loss of property, and, it is feared, of life also. At the time of publication the information received regarding it is somewhat vague, but it is reported that the fire is supposed to have originated from the locomotive of the lumber train drawn over Mr. J. E. Henry's railroad, which leaves the line of the Boston & Lowell R.R. between Twin Mountain House and Fabyans at New Zealand Station, and penetrates some distance into the woods in the direction of New Zealand Notch.

Three logging camps, several horses and hogs, a considerable portion of Mr. Henry's railroad, and a vast amount of lumber are said to have been already consumed. Fears are also entertained for the safety of some men, who were measuring wood. The reflection of the blaze in the sky was plainly visible in Bethlehem on Wednesday evening and the clouds of smoke seen arising over the fated locality at the time of going to press on Thursday evening indicate that the fire is still raging.

The imperiled men, five in number, we learn, narrowly escaped by plunging into a brook and are now safe.

A week later, on page 8 of this same paper, appears the only other contemporary notice of this fire that I could rustle up: "The forest fire reported last week as having started along the line of the New Zealand Railroad continued to burn for several days, consuming much timber, so that the rainstorm of Wednesday night was much welcomed in the district".

Hon. Joseph B. Walker of Concord, one of the early forest commissioners of New Hampshire and a leading crusader for enlightened cutting practices, gives further substantiation to the view of 1886 as the correct date for the Zealand fire, previously listed as 1888, in a speech made to the New Hampshire Board of Agriculture in February 1891:

"If there is any sight entirely disheartening, it is that of one of these fire-denuded tracts, from which everything has been swept clean, down to the underlying rocks. Any one who has visited the Zealand Valley withing the last *five* years [my italics] can attest to the truth of this assertion. For seven miles up the valley, the fire swept resistless across it from crestline to crestline of the mountains which wall it in. Neither bird, nor beast, nor man, nor tree could endure its arid breath and devouring flame. The river only and the naked ledges, with a few small sections too damp to burn, escaped destruction. As one now looks upon the two towering sentinels of fire-blasted rock which mark the opening of this valley [note picture of one of these, Middle Sugarloaf, taken several years after this fire], there blazes into his mind, in letters of living fire, the terrible inscription which Dante in his *Divine Comedy* placed over the entrance arch to hell: All Hope Abandon Ye Who Enter Here.

Irrespective of the year in which this fire blazed in fury, of one fact there is no doubt: It was a four-bagger!¹³ Chittenden listed what has uniformly been accepted as the acreage consumed, 12,000, and stated that the stumpage loss was \$50,000 at the time; and that a conservative estimate of the 1904 value of the spruce, not including growth increment, would be \$100,000. While it was still not big enough to shut down mill operations, it must have shortened the life of Zealand Village by several years. It did force J.E. to push his rails farther into the unburned, uncut acres of his realm.

The last great Zealand fire was another big one, 10,000 acres or more, but there were so many four-baggers going at the same time in this year, 1903, so much closer to homes, livelihood and dear ones that this Zealand fire never received the publicity such a catastrophe would get today. 1903 was the worst forest-fire year in White Mountain history. The basic cause was a virtually

¹³ I.e., a "general alarm fire".

rainless spring (precipitation in the mountains averaged about 0.3 inch of rain between April 17 and June 3). Early in May woods fires started breaking out all over the Granite State, particularly in the mountains. Only the arrival of severe, drenching rains on June 8 forestalled even greater destruction. Official reports indicate that in this period as much as 200,000 acres were burned in the state and over 84,000 acres in the White Mountains. The magazine, *Forestry and Irrigation*, stated in its July 1903 issue that "ashes from fire in the mountains in June fell in the streets of Nashua" and that the state's fire losses for May and June alone were about "three million dollars".

Detailed reports of the Zealand fire of 1903 are obscured in the picture of the total mountain holocaust. Neither *Among The Clouds* nor the *White Mountain Echo* started publication for the season until three weeks after these fires were out. The *Manchester Union* on May 28 stated that "great fires were burning in the Zealand Valley covering a portion burned in 1888 [1886] and also new timber". The loss exceeded \$30,000, and ashes and cinders were being swept daily from the local hotel porches. The *Boston Globe* on June 5, 1903, advised that "a big fire started in Zealand, a deserted hamlet on the west side of Mt. Stickney, and swept over a big area and was being fought by men from Fabyans and Twin Mountain".

Chittenden's report on the vast fires of 1903 was based on an exhaustive study by a team of eight forest experts, begun three weeks after the fires were quenched by rain. His report on the Zealand fire indicated that the area involved was in large measure not that involved in the earlier blaze and that it covered about 10,000 acres. The cause was not noted. Lest we jump to unwarranted conclusions, please remember that the Henrys had been out of this valley for some time. Their trains had not operated on the Zealand Valley line for six years.

Strangely, this fire left enough surviving growth right in Zealand Notch to cause a human tragedy within six weeks. *Among The Clouds* reported that on July 17, 1903, the nine-year-old son of a William Wallace was drowned when he fell into Zealand Pond while trying to pick berries growing along the shore.

Even now a casual visitor to this region does not have to be a naturalist or a forester to recognize that much of Zealand and its surrounding peaks has faced the white heat of forest fires of an extent unknown today. The evidence is there and will be for years to come. Yet more impressive is the present-day attraction of the region. The Zealand basin presents a remarkable and outstanding testimony to the infinite healing powers of Nature. Nowhere does New England offer a better example of regeneration after disaster.

Almost all chroniclers of any part of the J. E. Henry story agree on one point: the Henrys and their hands moved to a new home near Pollards in Lincoln, N. H., in the summer of 1892. The inferences in many of these stories are that by some miracle—that is, by something more than could have been expected from even such a resourceful man as J.E.—he, his family, the many hired hands and followers picked up their homes, other buildings and personal goods, loaded them on carts and wagons and filed in wellnigh endless procession through Franconia Notch to their new Elysian woods. A good story, but only partially accurate. True it is that the Henry part of Lincoln sprang up suddenly, but Zealand could not and did not die quite so fast as Lincoln awakened.

Behind the slow death of the Zealand operations stood the wasteful exhaustion of its forests and the beckoning, tempting tall timbers of the Pemigewasset—so easily seen from the southern edge of the Zealand cut but oh, so hard to touch! The entire area to the south of Zealand Notch (the Livermore-Bethlehem township line) was Livermore, originally Elkins Grant. Titles here were in the early days conflicting, but the best claims to them lay in the hands of those able lumbermen and barristers from Livermore, N. H., and Lawrence, Mass., the Saunders (see APPALACHIA, December 1960, pp. 209-214). Some statements in that article and quotations given there from *Yankee Jurist* have mentioned Henry's knack of culling timber from someone else's yard. It is a good guess that sometimes this knack was exercised south of the Bethlehem line in Zealand Notch before Henry's title to this area was actually his.

Henry Waldo in "A Short History of Lincoln" (address to the Conway Historical Society, June 26, 1960) covers most adequately the slow and devious methods by which Henry acquired ownership of this main body of the Pemigewasset wilderness south of Zealand. "For several years prior to coming to Lincoln they [the Henrys] had been sending 'timber lookers' into the area and a review of the Grafton County records shows many transactions whereby they had picked up what might have been conflicting titles prior to the principal purchase." What actually happened was that the best and least-disputed titles to this vast mountain country were originally held by the Saunders. These they sold in 1886 to everyone's friendly foe, George B. James, and his New Hampshire Land Co. The Saunders continued to hold their strong, judicial hands on James—in the form of substantial mortgages. In 1890 James transferred his recently-acquired title to the area to George Van Dyke, James E. Henry and the latter's three sons. Let us proceed with a further quotation from Henry Waldo's article:

The record indicates that almost immediately the Henrys were pushed aside by Van Dyke for on October 1, 1890, the same land described in the purchase and sale agreement was deeded to George Van Dyke alone. This transaction may have been agreed to in advance for on October 10, 1892, the Henrys came back into the picture by securing a deed from the New Hampshire Land Co. for the same tract previously deeded to Van Dyke. This conveyance acknowledged an outstanding mortgage to Charles G. Saunders in the amount of \$85,000 which the Henrys agreed to assume [not discharged until 1899] and they gave the New Hampshire Land Company another mortgage in the amount of \$75,000. On January 26, 1893, another deed conveying all of Van Dyke's interests, of any nature, to lands within the East Branch drainage to the Henrys was made subject to the Henrys' assuming certain mortgages then held by Saunders. The Henrys gave Van Dyke a mortgage in the amount of \$200,000. All these mortgages bear out the legend that the Henrys were hard pressed for cash when they arrived in Lincoln.

From these facts, showing the Henrys' need for cash, it is obvious that a sure-fire Zealand mill would continue to cut upper Pemigewasset spruce for sometime to come. Such was indeed the case. After the major move of many of Henry's men to Lincoln in 1892, one Bagley transferred his affiliation from the Berlin Mills Co. to Henry's Zealand mill. (It was because of her father's transfer that Miss Bertha Bagley met George E. Henry and became his wife.) Frank Boyle of Plymouth, N. H., confirms the statements of others with whom I have talked that only about half the Zealand homes were taken down and moved to Lincoln in 1892; and we already know that in 1893, as a part of the land dealings cited in the previous paragraph, Henry's men started cutting Van Dyke's logs from the Little River country to the west of Zealand (see APPALACHIA, June 1960, pp. 46-49). The end of Zealand as a part of the White Mountain scene of that time happened much more slowly than did the rebirth of Lincoln.

Zealand Mill operations flourished for a period of five years after 1892 due to the cuttings from the combined Van Dyke and Henry holdings. In 1897 fire was again to haunt J.E. on the Zealand site. This time it was for keeps. The mill burned down, and many other corporate assets were destroyed. This mill was a big one, and its passing must have been hot. Again we are indebted to the *White Mountain Echo*, July 3, 1897, for some of the details:

A portion of the unpicturesque hamlet of Zealand, which lies midway between the Twin Mountain House and Fabyans, fell prey to fire about the middle of May. The place with its sawmills and dilapidated huts has long been an eye sore[!] to the tourist, and were it not that many poor persons might suffer grievous loss thereby, there would be little cause for regret if the entire colony had been wiped off the face of the earth. There was consumed at the same time about fifty million feet of logs and two million feet of sawed lumber; and it is estimated that the entire loss amounts to \$125,000.

It was enough of a catastrophe for the Boston & Maine R.R. to give up ticket sales at their depot and transfer the agent from this "unpicturesque hamlet" a month after the fire. P.Y. Learned, quoted in this and earlier articles, was not working this station at the time of the 1897 fire, but he did recall that Boston & Maine trains continued to stop on flag notice at Zealand for two to three years more. This they had to do to serve what few inhabitants were involved with the operation of a small sawmill built after the fire to cut the balance of Van Dyke's Little River logs until 1900. But to all intents and purposes this date of 1897 marked the end of the Zealand Valley R.R.

In 1904, a year after the second of the great Zealand forest fires, the B. & M. R.R. removed their depot and broke all connections with whatever little was left of the Zealand line. From 1904 on, any claim to the right of way of the Zealand Valley R.R. would revert mainly to future followers of Thompson and MacDonald¹⁴—the foot passenger. But the memory of the line is a haunting one to many a tramper. Occasional ties, track spikes, and even Henry's gravel are there to surprise or annoy a daydreaming walker on what is now the Zealand Trail. When it happens to you, take a look around at a growing wilderness of great beauty and diversity. Don't forget that this is the same area which Ernest Russell in 1908 described as follows: "It is as if the contents of some vast cemetery had been unearthed in that little valley". If you look hard, some of the last-to-go bits of skeletons can be seen there, particularly on Mt. Hale and the Sugarloaves. But more important than any skeletons you may unearth is the lesson you should learn about the marvelous, recuperative powers Nature has put to work in this lovely mountain area. The Zealand valley and its once-cut mountains are a good place to be today—at any season. It has been for some years. It can be for years to come.

The scrimmage at Zealand was over for J. E. Henry and Sons Company. The big game at Lincoln was at hand. The Zealand valley and its memorable logging railroad had been good practice for all hands. Experiences here at times had been bitter ones. They were to prove valuable. Short though their time had been here, they had flourished. Success had attended Henry's learning on his Zealand lands. His hide and conscience, perhaps pricked by the crescendo of criticisms and taunts of the veranda trade—and of a rising new group, the conservationists,—were well toughened for the fortissimo of public blasts to come. An exciting saga was over. The "eye sore" of Zealand was done. On to Lincoln!

¹⁴ See above, p. 354.

CAMP 22 IN THE TWENTIES

by HAROLD H. LEICH

THE LOGGING ROADS on the sides of high ridges of Lafayette, Lincoln, Hancock, Carrigain, the Bonds, and many other slopes are wellnigh indelibly etched."¹ They are similarly etched on my memory, at least the ones on the east slope of Mt. Bond, since I once helped build a few yards of them.

In my college days, in the twenties, the term "Pemigewasset wilderness" somehow carried an ineffable romantic message. In nearly four years of walking, snowshoeing and skiing in the White Mountains I had had frequent glimpses into this area, but not until the winter of my senior year did I have a chance to enter it.

My visit resulted from an assignment in an industrial relations course to spend a few days of the 1928 Christmas vacation in a plant in order to gather material for a paper on labor problems. This task did not fit in too well with my plans for a single-handed skiing vacation. But then I remembered an acquaintance in the logging industry, and a letter to him brought a prompt invitation to work in the woods for the Parker Young Company.

En route to my new job I skied into Franconia Notch after the stage had dropped me at Franconia Village. Following a lonely night at the small frame D.O.C. cabin, formerly an engineer's residence for the vanished Profile House, I continued skiing down the Notch over new-fallen snow until I was offered a ride near the Old Man of the Mountains. My benefactor, a retired logging contractor, entertained me all the way to Lincoln with tales of his ancestors. His grandfather's great-grandfather's grandmother was an Indian maiden who had healed his remote ancestor's broken leg and seduced him with her charms. His own father was a mighty man endowed with two spinal columns. He could lift 900 pounds with his bare hands but placed little value on this temporal asset, for in early life he felt the call to the ministry. He used to step out on the public platform and have his audience in the last stages of hilarity; then in five minutes strong men would weep.

HAROLD H. LEICH, a member of the Club living in Maryland, is Chief of the Program Planning Division of the U.S. Civil Service Commission. At Dartmouth, where he graduated in 1929, he was active in the D.O.C., and served for two years on the summer trail crew; in 1931 he was a member of the A.M.C. crew building the Galehead and Zealand Falls Huts. He has been vice-president of the Potomac Appalachian Trail Club and president of the Ski Club of Washington, D. C.

¹C. Francis Belcher. "The Logging Railroads of the White Mountains." *APPALACHIA*, December 1959, p. 516.

That afternoon I had a chance to visit the big paper mill at Lincoln where the Parker Young Company chewed spruce logs from its woods camps into pulpwood for the paper machines. Hardwood logs were converted into such forest products as wooden heels and piano soundingboards. The company was a large integrated operation with vast timber holdings; it took a spruce tree on the mountain slope all the way through the process to a bale of scratch pads in a customer's warehouse.

I caught the woods train out of Lincoln the next morning as she was coaling in the yards. She was leaving for the wilderness, pushing a string of twelve sets of empty logging trucks. I rode the caboose with some others who were newly hired. We were riding the main stem of the East Branch and Lincoln Railroad, the private line of the Parker Young Company. (The East Branch, of course, referred to that branch of the Pemigewasset River.) It was a scenic ride upstream past frozen pools and cataracts. The mountain country lay under a heavy blanket of snow, indispensable for logging in those days, and woods operations were going strong.

An hour later we reached our destination, Camp 22, about 12 miles from Lincoln. The camp lay in a broad valley east of Mt. Bond, a mile beyond the junction of the North Fork with the East Branch. The A.M.C. map of the Franconia Region, 1960 edition, still shows the site of Camp 22, although the guidebook description of the Thoreau Falls Trail omits any mention of the place. The U.S. Forest Service now maintains the North Fork Cabin at this site, which is 1.8 miles south of the place where Dr. Miller and Dr. Quinn lost their lives following the crash of their plane in February 1959.

At the time of my visit the mountain slopes near Camp 22 had already been furnishing pads for the school children of St. Louis for many years. The lower ridges were denuded of timber and marked by roads which had been spotted by loggers with no degrees in engineering. The general character of the country is well illustrated by two photographs in the December 1959 APPALACHIA: the cover showing the cliffs of Bond (by Miriam Underhill) and a picture opposite page 524 of Mt. Hancock (by Bradford Washburn). Only the upper slopes of spruce and fir remained in their original state.

The buildings of the camp, all grouped near the railroad track, consisted of rough frame structures painted red some years before. The largest was a barn-like sleeping shack. A cook shack and the stables stood nearby and four or five miscellaneous shanties occupied by the clerk, foreman, feeder and blacksmith completed the array.

Mr. Boyle, the walking boss, and the only man in camp with a handle to his name, told me he could not assign me to work till



Harold H. Leitch

LOOKING SOUTH FROM CAMP 22, DECEMBER 1928

Mount Hancock on extreme left, ravine of Crystal Brook, and N.W. peak of Hancock with pattern of lumber roads; Mount Hitchcock on right.

LOOKING NORTHEAST FROM CAMP 22, DECEMBER 1928

Harold H. Leitch



afternoon, so I walked over to the two-story sleeping shack to pass the time. The crumb boss, a feeble old man named Mike, showed me to my bunk in the upstairs loft, where three rows of double beds were ranged under the low roof. Mike told me that my bedmate was Tim Hart, an old Irishman. The lower floor contained a number of cell-like rooms for two men each; these were for teamsters and others of higher occupational status than those of us in the loft.

I spent the morning listening to the chatter of some French-Canadians who had laid in because of sickness. A gong sounded at 11 and they bolted across the yard to the cook shack, where they were soon digging into a meal of boiled spuds, corned beef, canned tomatoes and rugged looking tea. A crude sign near the long tables read: "No talking per ord. cook". The idea seemed to be to gobble it down and have done with it.

Later, when I was working hard, I got up some enthusiasm for the grub. Beans and doughnuts were served at every meal and pie at least twice a day. But it was the prunes that pulled me through; after one meal I counted twenty-one pits on my plate, not including those I had swallowed. Both the tea and the coffee looked like boiled harness water, so I relied on prune juice as a beverage and found it to possess sterling qualities.

Following the noon meal Frank Couette, a foreman, escorted me 2½ miles up old logging roads to the scene of my expected labors, high on the side of Mt. Bond. We were at the cutting edge of the logging operation, where sled roads had to be swamped and grubbed into the virgin mountainside as the first step in removing timber. It was easy to see that the game was nearly played out in that area: I saw no forest giants in the mixed stand of conifers and hardwoods, and above us, not far away, gleamed the summit crest of frosted spruce and fir the size of Christmas trees.

There, with new Maine double-bitted axe in hand, I was abandoned to the road boss, a fierce little French-Canadian seventy-three years old named, unexpectedly, Mike Sheehy. He and his brother Pat were famous roadbuilders of the day. Mike was equipped with keen, piercing blue eyes, an eagle beak and a stiff brown moustache. Under his close and insistent direction I spent the afternoon felling small spruce trees, trimming them and fitting them into the outer bank of the new road. Mike, his normal aspect rendered all the fiercer by a sharp icicle at each end of his moustache, delighted in bawling me out for my poor choice of trees and the time I took. "Cut *dat* one," he would shout at me, waving at the whole forest, and my only problem was to pick the right tree.

In building the road farther up the mountain the first thing was to cut the brush and timber, called swamping, the most

menial job in the woods. Then came some work with grubhoes to dig down the upper side so that the roadbed would be nearly flat in cross section; the frozen, rocky soil made this an arduous job. Next some stakes, called bunters, were driven in along the outer bank and supported by side-logs to keep the loaded sleds from skidding off the roadway. After a good snowfall the new section was now ready for use.

The whole camp laid off the next day, a Sunday. Most of us loafed around the wood stoves and chewed the fat. Some built little fires along the North Fork to boil their clothes; some shaved and washed themselves; some played cribbage, red dog, or poker; a few read, and one or two wrote letters. The others mended their breeches or tried to sleep, mingling rasping snores with the low murmur of the camp at rest. Sixty of us shared double beds in the loft, and the air was soon blue with rank tobacco smoke.

During the following days I worked under Mike's supervision with a lanky older man, a down-easter who could have been a model for Philip Goodwin's paintings of the Maine woods. "Big tall feller" was the only name I heard him called. He and I would get up, eat breakfast, and be at work near the mountain top while it was still dark. We saw some beautiful scenes at sunrise, since the view swept from the rugged eastern wall of Zealand Notch across vast stretches of wilderness to the jagged peaks of Carrigain and Hancock. The most prominent skyline feature was Carrigain Notch, a sharp, deep slit in the sawtooth southern horizon. Once or twice I saw the summit crest of Mt. Washington gleaming over Zealand Notch.

Every morning at 10.30 Mike would go for water, build a fire, stew up some tea in a bucket, and call us for lunch at 11. We would toast our thick beef sandwiches over the fire and enjoy a good meal, squatting in the snow. Then we would work till 4.30, when the purple band around the horizon after sunset would forecast a frosty night. We would drop off Mike at the choppers' camp on the mountainside and ease down to Camp 22 after dark.

There were two groups of men in Camp 22: French-Canadian farmers, some of whom returned year after year when their autumn work was done, and Americans, largely of the transient labor class. The French-Canadians were a steady lot and some had worked up to the better jobs—teamsters, straw bosses, etc. Many of the Americans were typical floaters who quit as soon as they had earned a small stake. Some of them had spent time at sea or had cut ice on the lakes and rivers of New England before artificial refrigeration ruined the market.

The wage scale certainly did not encourage a high type of labor. The lowest rung, which I occupied as a swamper, paid \$2.50 a day, while the skilled hands—choppers, landing men, sled

tenders, etc. got \$3.75 a day. These amounts were reduced by the daily board bill of \$.85, which continued to run against us on holidays when we earned no pay.

Christmas dinner was a very special occasion: we had a dishpan full of boiled roosters with plenty of spuds, half-mashed for the festive meal. On Christmas night the crew became hilarious with the help of a gallon or two of alcohol; there was much stomping and fiddle-scraping on the first floor, and singing and shuffling around a mouth-organ player upstairs. I became well acquainted with four young Americans who bunked near Tim and me. They would not let me sit on their beds—they said they knew I was not lousy, although “you never can tell”—but I was privileged to join the inner circle on a bench that spanned the loft. There they held forth with song and story. Favorite tunes were “Cowboy Lovesong”, “Cousin Nelly”, “Letter Edged in Black”, “Wreck of the Old 97” and “The Jealous Lover”.

In the remaining days of my employment I was the special object of Mike’s vociferous tutelage. Sometimes he would grow furious at my ignorance and stand over me, as I toiled at some task, in an effort to drive some sense into me. A brief sample of his daylong harangue would run about as follows:

“Hey—ey— you feller down dere. You, yes you, you tall feller dere. What you do now, you ——? Now cut dem jillpokes—fill up de holes, you know. Against dat side-log in de big hole, you know. No! Not like dat. Trim like I do, you see, like *dat*, you see, like *dat* . . .”

A near-crisis came one day after lunch when he yelled, “Haf you seen my dyxqrtzite?”

“Your *what*?”

“My dpkjutwzqmitel!”

“Your dollar pipe?”

“Ach, no, Jesu Christ, my dsrplwmitel!”

Finally I discovered he was searching for his dynamite to blow up some ledges.

Fortunately the “big tall feller” was usually with us as a buffer. Sober, solemn, always grouching about Mike and the company, he treated me kindly and told me of his adventures on the bum. Much of the time we worked at opposite ends of a cross-cut saw, cutting up the bigger trees for side-logs.

“All right, now, chummy,” he would say, “fetch over that saw. Scrape away the snow there and we’ll get after this one. Can’t you get around there, stern-to? She’s pinchin’, eh? Let’s have that axe, chummy. Now split, you fish-eyed son of a seacook, split!”

Despite Mike’s irritation with my awkwardness, I felt I was making a little progress; by the time I quit I could wield a grubhoe and cantdog, and drop birches, “popples” and “pulpes” just where I wanted them.

I left one frosty morning with four or five others. We boarded the caboose, switched back and forth from the North Fork to Stillwater picking up loaded logging trucks, and rolled downstream to the mill trailed by several hundred spruce and fir logs. In Lincoln I said goodbye to the friends my mouth organ had made for me in the caboose, drew my pay of \$4.21 for three and one-half days of work out of six days in the woods, and expressed my skis back to college.

The next day I unstrapped a pair of bearpaw snowshoes from my packsack and climbed the frozen crust on the D.O.C. Breezy Point Trail over the southeast shoulder of Moosilauke (now the approximate route of N.H. 118). The first occupied house off the mountain belonged to George French, who had hauled supplies up the Moosilauke Carriage Road for us the summer before on his buckboard. The old codger met me on the threshold.

"Don't suppose you could handle a suck of good hard cider. Kin you take it through a quill?"

The "quill" was a hollow weed-stem, sunk deep in a hogshhead in George's cellar. The cider was cool and went down without persuasion.

"Go ahead, boy, go ahead, it won't hurt you none."

"Really, Mr. French, . . ." Gurgle, gurgle.

I could offer no resistance when Mrs. French invited me to dinner. We sat there assimilating chowder while George talked about his forty years in the woods and I spoke freely myself of cantdogs, grubhoes, and double-bitted axes.

As for the paper on labor relations, I not only identified six major problems at Camp 22 but filled in the answers as well. As a brash college senior, imbued with the new philosophy of "human relations in management", possibly I did not realize that Camp 22 was no better and no worse than dozens of other logging camps from northern Vermont to eastern Maine, and that employers were caught in the squeeze of slim profit margins, depleted timber stands, western competition and the long tradition of their industry. At least I had the good grace not to send a copy of the report to my friend in Lincoln.

VIRGIN FORESTS IN THE WHITE MOUNTAINS

by **FREDERIC L. STEELE**

AT THE TIME of the arrival of the first settlers most of the state of New Hampshire was covered with forest. So far as can be determined, only salt marshes, swamps and a few natural openings were unforested. At present nearly all the original forest has disappeared, much of it many years ago. In the central and southeastern parts of the state, where no traces of it are left, plant ecologists cannot even agree on the composition of the original forest. Presumably much of it was dominated by oaks and hickories. In the southwest a small tract belonging to Harvard University contained primeval forest until 1938, when it was all destroyed in the hurricane of that year.

In the mountainous parts of the state, from the Sandwich Range northward, the history of the forest is much better understood. The mountains at elevations above 2000 feet were covered by woods consisting primarily of red spruce and fir balsam. North of the Presidential Range white spruce formed a significant part of the plant community, probably, however, occurring only on the lower slopes. It is not easy to determine how common it was. As the logging operations in the mountains have been relatively recent, beginning a little more than 100 years ago, many people still living can recall seeing fine stands of primeval forest. An example is Sandwich Dome, also known as Black Mountain in reference to the dense stands of spruce which formerly covered it. All this has been cut except for a few small patches, such as occur on the upper parts of the Gleason and Bennett Street Trails. The Beebe River (logging) Railroad was not removed until World War II, although logging operations were discontinued eight years before this. Most of the later logging in the White Mountains consisted of clear-cutting operations and, where the wood was used for pulp, trees were taken down to a very small size. From the top of a centrally located mountain, such as Bond, it is easy to see the extent of the logging operations. The courses of the former logging roads can still be seen circling the mountains in ascending spirals, frequently right to the top.

In the areas where spruce and balsam are the climax trees, a virgin forest can usually be rather easily distinguished from second growth, even though the latter may be quite old. Stumps,

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which may persist for fifty years or more after a logging operation, are of course the clearest proof of former cutting. Moreover, the second growth will be characterized by trees all of approximately the same age and diameter, although there may be scattered large trees which were not harvested because they were of poor quality. In an early stage in the succession fire cherries and other short-lived trees will be mixed with the evergreens. In the virgin forest there will be many large straight trees with no branches for the first twenty or thirty feet. However, where natural openings have once occurred, there will be trees of all ages and sizes. This is the most characteristic feature of a virgin forest. When a mature tree eventually dies it falls to the ground and remains there for many years, perhaps supporting a growth of young trees from its prostrate trunk.

What is left of the once extensive and beautiful forest which formerly covered the White Mountains? In the first place, on the higher ridges, where trees are ten feet or less in height and not much more than six inches in diameter, cutting was not economically feasible. Thus a number of small patches of diminutive primeval forest remain, as on the Twin Range or on the top of Mt. Whiteface. Occasionally a small tract of larger trees would be left, either because it was in some inaccessible location or because the land was too steep to make logging practical. Below the top of Mt. Passaconaway there is a small plateau area, at the top of a steep ravine, where some of the spruces are two feet in diameter and may be 150 years old. Elsewhere in the mountains there are a number of ravines with steep slopes rising from the central brook, where patches of trees have been left.

Although most of the White Mountains is now in the White Mountain National Forest, the policy of the U.S. Forest Service is not necessarily to preserve the forest unspoiled, but in general to manage it on a sustained-yield basis. Furthermore, much of the forest had already been logged before the land was acquired by the government. The Forest Service has a multiple-use concept under which different parts of the area can receive different classifications. A considerable amount of growth is now preserved, primarily for watershed protection, and some small tracts of original forest are being kept for their scenic value. These include strips along Glen Ellis Falls, Crystal Cascade, Eagle Cliff, Tuckerman Ravine, Greeley Ponds and Cascade Brook.

Two large areas are the 900-acre Gibbs Brook tract, lying between Gibbs and Elephant's Head Brooks in Crawford Notch, preserved through the land-use plans of the U.S. Forest Service, and a 5000-acre tract in the Great Gulf which was recently classified as a Wild Area by the Chief of the Forest Service and is thus permanently preserved. The Gibbs Brook area contains forest which has been undisturbed for a long time, although it

has probably been subject to some culling of the best trees by early settlers. The terrain is steep and there has been heavy damage by windfall. A number of large spruces, up to two and one-half feet in diameter, remain. Although walking is difficult because of fallen trees and steep slopes, the area is of considerable interest. The Great Gulf Wild Area has a number of stands of virgin forest, most of which consists of rather small trees, owing to altitude or to thin soil on steep slopes. The spruce-fir woods in the Great Gulf, Jefferson Ravine and Madison Gulf are picturesque and attractive. Although there are a number of Wild Areas in the west, this is the first to be so designated in the White Mountains.

There are at present in New Hampshire two very interesting tracts of virgin forest which contain trees of large size and great beauty. One of these lies in the township of Pittsburg, in the northernmost part of the state. This tract, of about 100 acres, is located just to the northwest of Norton Pool on East Inlet of the Second Connecticut Lake. It is easily reached by driving on a dirt road, not shown on existing maps, to within one-fourth mile of the area and then following a logging road to the northeastern edge of it. The road and the tract are both owned by the St. Regis Paper Company which for the present, at the instigation of the New Hampshire Natural Preserve Forum, is preserving the area because of its great ecological interest and esthetic appeal.

The forest is composed of red spruce and fir balsam, with some white spruce on the lower swampy areas and scattered white birches, of a type mostly restricted to higher elevations, known as variety *cordifolia*. Many of the spruces are large, up to two feet in diameter, straight and tall, with no branches for the first twenty or thirty feet. The red and white spruces look somewhat alike, and are most easily distinguished by the cones, which are usually found in abundance under the trees. The white-spruce cones tend to be long and cylindrical, in contrast to the shorter egg-shaped red-spruce cones. Interspersed in the forest are openings, presumably left by the fall of large trees. Some of these openings contain only alders and viburnums, with a few young spruces coming up underneath. Other openings have trees of various sizes, some of which are already losing out in the upward race for light. When a single tree falls, a number of years are required for it to decompose into soil. One of the most picturesque features of the forest are the trunks of fallen trees of a decade ago, covered with dense layers of moss out of which grow more than a hundred miniature spruces and balsams. A striking feature of the floor of this forest is the covering of moss. Much of the soil is swampy, and the combination of abundant moisture and heavy shade seems to provide ideal conditions for

promoting a moss flora of great variety and beauty. On parts of this covering there are numbers of small trees ready to take immediate advantage of any openings that might occur. Much of the ground, however, is covered only with moss and a few shade-tolerant northern herbs.

The largest stand of primeval forest in the state is an approximately 1000-acre tract along the upper reaches of Nancy Brook. This is located primarily on the 3000-foot plateau area above Nancy Cascades, but it extends almost to the top of Duck Pond Mountain and on the steep slopes of this mountain reaches the south side of the brook well below the cascades. Apparently the area was beyond the boundary of the Pemigewasset Valley timber sale, and it was not logged from the Crawford Notch side because of the steepness of the terrain and inaccessibility of much of it. The steep north side of Nancy Brook, which has been logged, is now scarred with a number of landslides. The forest is reached from Notchland by following the A.M.C. Nancy Brook Trail (Trail 275 on the U.S.F.S. 1942 map of the White Mountain National Forest).¹ Although the area is in the National Forest it is not in a protective status, but will probably not be logged in the immediate future because of inaccessibility.

Red spruce and fir balsam are the dominant species in this forest. White birches (variety *cordifolia*) are scattered among the evergreens. Shrubs are rather sparse, but include hobblebush, mountain shadbush and viburnums. As in all virgin forests the trees are of various sizes and probably, on the average, not so large as those of the former primeval forests on lowland sites. The average diameter of the mature spruce is fourteen inches, but some run up to two feet. In contrast to the thick, close-packed second growth woods, it is easy to walk through this forest, in which the trees are widely spaced, although in places passage is blocked by trees which have been subject to windfall, struck by lightning, or have died from disease or old age. These woods are markedly different from any others which would be encountered on A.M.C. trails and a trip to the area would be well worth the effort. Here one may view the kind of forest which originally covered much of the White Mountain area. If this should be logged, the last of the original forest would be gone, except for occasional small patches. We may hope that the United States Forest Service will eventually classify it as a permanently protected area.

¹ This trail has been reopened to slightly above the falls and blazed all the way to Nancy Pond. The trail is not at present signed, but will be as soon as completely opened, perhaps this summer.—Ed.

VARIOUS NOTES

ALPINA

Ama Dablam (22,494 ft.), a very difficult peak a few miles south of Everest, which a British party had attempted unsuccessfully, with the cost of two lives, in 1959, was climbed in March by Sir Edmund Hillary's scientific expedition, which has been active in the Himalaya since last September. Four members of the expedition—two New Zealanders, an Englishman, and an American, Barry C. Bishop, A.A.C.—reached the summit. On the descent one of the Sherpas was injured, but was brought down and flown out to Katmandu for medical attention.

Hillary's expedition, which includes half a dozen Americans, has had as principal objective the making of acclimatization tests during a prolonged winter stay partly at 18,000 and partly at nearly 20,000 feet. The intention was then to climb Makalu (27,790 ft.) without oxygen, as confirmation of the acclimatization experiments—and this may well have been done by the time this note appears. A third purpose has been to make a thorough search, covering some 200 square miles, for a yeti. For this purpose the expedition carried some so-called "capture guns", which are airguns shooting hypodermic needles which will knock a creature unconscious long enough to permit zoologists to examine it. At the time of writing (mid-April) we have had no report on the outcome of this work of the expedition. (See however below.)

The ascent of Ama Dablam seems not to have been included in the authorization given the expedition by the Nepalese government. In consequence, the government threatened to order the expedition to withdraw, and in order to save it Hillary was obliged to fly back to Katmandu and weather a crisis lasting over two weeks. (*The Times*, London.)

The north wall of the Eiger was reported to have been climbed for the first time in winter on March 6-12 by three Germans and one Austrian, led by Toni Hiebeler.¹ The climbers spent six nights on the mountain, with temperatures dropping as low as 14°F.; the days, however, were comparatively warm, fine and dry. There was little danger of avalanches, due to the hardness of the snow, and none of rockfalls, as the sun scarcely touched the wall. Instead of ice-axes, too unwieldy because of the steepness of the slope, special ice-hammers were used, and a 600-foot rope was carried to serve for rappels in case a retreat proved necessary. Crampons were worn throughout the entire ascent. The success of the climb was in doubt until the very last day, and after crossing each difficult passage the men considered carefully how a redescent might be made. (*The Times*, London.)

Some three weeks later, however, an investigation by a special committee of the German Alpine Club brought out the fact that the climb had not been done in one trip. For the second section the climbers had made their way out onto the wall from the Eigerwand station of the Jungfrau Railway. Still this was indeed a major

¹ Editor of the mountaineering periodical *Der Bergkamerad*.

achievement, including the most difficult passages of the wall, as well as two-thirds of its length, and, had the facts been reported accurately in the first place, would have been worthy of great acclaim.

The Red Sentinel route on the Brenva face of Mont Blanc, a very difficult and dangerous climb, was done for the first time in winter, in March, by two Italians, who spent three nights on the mountain.

The Yeti a Mountain Goat? It is reported that after much difficulty Sir Edmund Hillary (whose scientific expedition to the Himalaya is noted above) succeeded in sending to Europe, for expert examination, the scalp of a supposed yeti which has been preserved for some 250 years in the Klumyung Monastery near the Nepalese-Tibetan border. (The scalp was allowed to go only on condition that it be escorted constantly by one of the Nepalese and returned to the monastery in early January—which was done.) The scalp was examined thoroughly by various Western scientists and the opinion finally given that it is that of a "serow", or goatlike antelope native to the Himalaya, since it proved to be identical with a scalp of this kind which is preserved in the Royal Institute of Natural Science in Brussels. This however leaves the problem of the bear-like tracks of the supposed yeti unsolved, since the prints of a bear and those of a cloven-hoofed ruminant are quite different! (*Die Alpen*, March 1961.)

Miscellany. Greenland seems to be exerting much attraction as a region for mountaineering. Four major expeditions visited the country in 1960: an English expedition under the leadership of Sir John Hunt, which made thirteen first ascents; two Italian expeditions, making together six first ascents; and a Danish expedition, fourteen first ascents.

Last summer the Zermatt Breithorn (13,660 ft.) was climbed by a German, Franz Merkt from Württemberg, who had lost both his right leg and his left foot from a shell-burst in the war. According to his guide the ascent was made in normal time.

The famous Swiss guide, Joseph Georges of Arolla—known as "The Skier" because he was one of the first of his profession to take up alpine skiing,—died last September. His greatest exploit was the first ascent of the north ridge of the Dent Blanche, in 1928, with our corresponding members, Ivor and Dorothy Richards.

On February 15 the Riffelalp Hotel, 2000 feet above Zermatt on the slopes of the Gornergrat, was destroyed by fire. Built in 1884, it had always been a favorite resort of mountaineers because of its incomparable view, across the valley, of the Matterhorn.

Abinger Afghanistan Expedition 1960. *Joyce Dunsheath reports on her trip of last summer (see APPALACHIA for December 1960, pp. 244-5) as follows:* We had quite an adventure climbing Damavand, the highest mountain in Iran. After wasting a whole day seeking advice on a route and trying to find a local guide to come with us, we finally planned our own route and set off without guides or porters. Eleanor Baillie, who in any case was not feeling one hundred percent fit owing to a mild attack of dysentery, had the misfortune to stumble early on the

climb and crack the base of her middle finger. This slowed us down considerably and we consequently had to bivouac three nights on this stony waterless pile of volcanic rubble before reaching the summit (18,900 ft.). But this was as nothing compared to the nightmare descent. Without water, Eleanor got weaker and weaker, so that on the fifth day she could go forward only a few yards at a time. We were the only climbers on the mountain, but after we had struggled down to pasture level, a shepherd gave us hot tea and goat's milk curd and, setting Eleanor on a donkey, led us down the last thousand feet to the hospitality of an American construction camp, from where we returned to Teheran, 60 miles away.

We reached Kabul on August 14 but had to wait eight days for our equipment to arrive by sea. In the interval our visas were extended and permission reaffirmed for climbing but withheld for travel in Nuristan because of raiding hillmen. We eventually set off with half a ton of baggage in a 10-seater bus to the village of Zeneh (60 miles), but here the road ended and donkeys were hired for the three-day trek to Kaujan. A soldier was officially attached to us as guard. At Kaujan we were able to substitute horses for donkeys and on August 26 the party of two women, four horsemen, two porters and a soldier set off up the stream which flows down from Mir Samir to join the Panjshir at this point.

A base camp was set up after two days' march at about 12,700 feet and the horsemen went home, leaving the two porters to carry higher. These men were very unreliable, so that it was difficult to plan ahead. From this camp, however, a week was spent as intended in practice climbs on unnamed mountains: one we named "Twintop", but here as in most cases the last summit pinnacle was impossible because of the rotten and crumbling nature of the rock.

On September 5 a second camp was set up at about 13,500 feet and, after two nights of good weather, it was decided to establish a camp from which we hoped to reach the summit of Mir Samir. A tent and provisions for five days were carried to a height of 15,000 feet, the porters returning the same day to Base Camp. They hated the cold! The next day we made a reconnaissance of a route to the summit by the S.E. ridge which appeared to be feasible with one bivouac en route. That night, however, the weather broke and by daybreak it was evident that the climb could not be undertaken for several days. The fall of snow on the unstable rock made conditions extremely dangerous and an immediate descent had to be made to the camp below.

After a few days the weather cleared but the porters would not go up again, so the attempt on the summit was abandoned. It was decided to return to Kaujan, from there follow the Panjshir to its source, and go beyond to the Anjuman Pass, where we might reasonably hope to get at least a distant view of the Pamir. Fresh horsemen were recruited with considerable difficulty and all the way up the valley there was opposition from the natives, who feared we should be killed by Nuristani raiders. By sheer persistence we eventually reached the pass and from a nearby camp made an ascent of "Schönheit" (approx. 13,500 ft., named by a German party the year before) and gained a height of 15,000 feet on another unclimbed, unnamed peak. On September 23 the expedition began the return journey to Kabul.

We had an interesting journey by train and bus through Pakistan and Kashmir to India, reaching England again early in December.

JOYCE DUNSHEATH

Around the Valsavaranche. If you would enjoy some delectable and not particularly difficult climbing from a delectable and not particularly accessible valley you could do much worse than examine the claims of the Gran Paradiso, the culminating peak of the Parco Nazionale of that name and the highest mountain entirely in Italy. But it would be well not to leave it too long and not to time your ascent for a Sunday morning.

We had spent the best part of a week making acquaintance with the more northerly and easterly area of the Paradiso range from the beautifully situated village of Cogne, in the course of which we had sat out a storm in the Rifugio Vittorio Sella, climbed the Gran Serra (3552 m.) in glorious conditions, and greatly admired the plentiful and vivid flora and the spectacular herds of stembocchi. La Grivola had seemed too formidable an objective for so early in the holiday and the Colle de Lauson (3296 m), leading westwards to the Valsavaranche, had called a heavy rainstorm to its defence, so we returned to Cogne slightly demoralized and took the bus back and down to Aosta, where we intended to take another bus to Dégioz, as far as it would go up the Valsavaranche, in the hope of finding beds and lodging. A chance remark in the tourist office in Aosta gave us the much better (and not much more expensive) idea of taking a small taxi to Pont, several miles farther than a bus can penetrate, where we started sounding the few hotels in the valley. We were greatly relieved to be most hospitably received in the second we tried—the Fior di Roccia, small, very new, impeccably equipped, and most obligingly run.

The next day we made our perspiring way up the well-graded track to the Rifugio Vittorio Emmanuele II, like the Sella a former royal hunting lodge (Rifugio di Caccia on the older maps) and now a hut of the Club Alpino Italiano. The original buildings are still in fair shape, but a handsome and spacious new building standing just below them offers creature comforts and full hotel service to compensate for the lack of romantic tradition. There are two schools of thought as to the height of the hut, the latest maps showing it as 2732 meters, leaving 1229 meters to go to the summit of the Gran Paradiso. Our first attempt on the summit was frustrated at about 3500 meters by low cloud blown in by a strong and very cold north wind. The weather improved immediately we had returned to the hut, so we spent a lazy day soaking in the sun and scenery in preparation for a second early start. Next morning we arose again at 3.30, to find a fair-sized congregation of Italians celebrating Mass before an altar set up in the dining room. Their devotions gave us time for a head start towards the Ghiacciaio del Gran Paradiso, which was to be our highway to the summit, and for four hours or so we made our way easily and steadily up the hard snow of the glacier. At about 8.30 we emerged into the sunshine near the spectacular cliffs of the Becca di Moncorvé and rested for a spell before resuming the pleasantly varied route. By now the views were becoming very extensive, with a splendid outlook towards the Mont Blanc range to

the north, the Grande Sassi re to the west, the Meije to the southwest, and far off to Monte Viso.

The angle steepened somewhat towards the summit ridge and we were overtaken by several ropes of half-a-dozen or more climbers, so that when we arrived at the final rock crest we found it rather overpopulous. Their footwear and antics suggested that many of the assembled multitude may not have been on a high mountain before, but their vigor gave no such hint and they had breath to spare for an enormous amount of conversation which appeared to combine elements of instruction, exhortation, anxiety and plain high spirits. The din was more appropriate to a *trattoria* on a Saturday evening than a mountain-top on a Sunday morning, and we were relieved when the press began to thin out and we were at last able to proceed to the summit in peace and comparative security. This is a splendid belvedere and we took in a prodigious panorama—all as clear as a bell except for the Po valley, which lay hidden under its pall of haze. Our only disappointment was afforded by the insignificance of the Gran Serra, which had seemed such a worthy peak when we had straddled its summit a few days before but which now proved to be very small beer.

The descent went without incident, the snow remaining hard down to our point of the previous day and being glissadable thereafter. For much of the way down the glacier we were diverted by the splendid aspect of the Mont Blanc massif, heavily decorated with new snow and startlingly clear in the morning air. We duly refreshed ourselves at the hut, paid our very modest bill, and jogged down into the deep trench of the Valsavaranche—a total descent of 7,000 feet from the snows and vistas of the Gran Paradiso to the fragrant woods and floral meadows around Pont.

For our final day we took the mule track which picks its way up the precipitous west wall of the valley and leads into the as-yet-peaceful hanging valley of the Piano del Nivolet. We took our time, basking in the sunshine, and were able to follow with binoculars the progress of the five climbers who made up the entire population of the Gran Paradiso this fine Monday morning. A rueful comparison with the sixty-odd of the Sunday and seven (including ourselves) of the Saturday was inevitable. We strolled past the herd of cattle grazing the lush pastures and made the Colle Nivolet in the early afternoon, to meet a fleet of small Fiats brought up by the splendid new road, built by the city of Torino, which snakes its way up to the col by way of Ceresole Reale. This is merely the first instalment of a new highway to connect Torino with Courmayeur and Chamonix by the Mont Blanc tunnel, and already a start is being made on the formidable engineering works to get the road in one great traverse from Pont up into the hanging valley. In a few years, it seems, the peace of the Valsavaranche will be a thing of the past, but meanwhile all is delight.

FRANK SOLARI

WINTER CLIMBING

The A.M.C. Season. The most important innovation in the Club's winter-climbing activities this year was the use of double-wall tents on a number of trips and the consequent luxury of being able to lounge

around after supper in string shirts with the temperature well on the warm side of comfortable. On two occasions in my tent, which sleeps four, the inside temperature on our waking in the morning was 20 degrees above that outside, even before the stove was lit. This gracious winter living did not detract too much from our eagerness to gain summits and, although there is nothing spectacular to report, many fine winter ascents were made and quite a few people were initiated into the wonders of the winter mountains.

Two of the trips were for the specific purpose of introducing beginners to winter climbing and instructing them in the basic techniques of climbing and backpacking. On one of these weekends we had four separate parties spread out over the White Mountains, from Kinsman on the south to Adams on the north. These trips attracted a total registration of over fifty and were run under the general supervision of Charlie Fay and Dick Judy.

The Howker Ridge on Mt. Madison has been climbed before in winter but I believe no one had had the fun of camping on it at that season until Chris Goetze's trip in early February. Our camp was high up on the ridge, in the sheltered col between the second and third Howks. The ascent of Madison from this camp in the still, early-morning sunshine, first up through the partly buried fir trees and finally onto the open ridge of snow and rock, was a delightful experience.

The most ambitious plan for the winter was a traverse of the Maahoosuc Range from Grafton Notch to Gorham. Chris Goetze holds the summer speed record for this (8 hrs., 6.5 min.); Michael Edesess and I went along with him so that we could be in on the establishment of the winter speed record. On Feb. 18 we started off up Old Speck with supplies for five days, which included a complete expedition morale kit (a collection of trifles aimed to cheer). The trail was steep and snowshoe steps had to be kicked in loose granular snow most of the way, so that we were all showing signs of wear when we reached the top. As we pulled into Speck Pond at dusk the first spatter of rain fell. Chris was not too confident of the rain-repelling powers of his new winter tent, so we pitched it inside the Speck Pond shelter and crawled in for a restful night.

At the standard wake-up time, 5 a.m., we were greeted by the swoosh of snow, as it avalanched off the fir trees, and the drum of rain on the shelter roof. Chris got up, went out and took a temperature reading—38 degrees—and then we all went back to sleep. During the morning, while the rain fell, we ate steadily, took temperature readings inside and out, and discussed the advisability of continuing the trip. At 1 p.m. the temperature reached 47 degrees, Chris proclaimed that winter had ceased, and we forthwith packed our gear, including one unused morale kit, and headed back over Old Speck to the car.

That same weekend Bill Biddle and party were experiencing similar weather on the Garfield Ridge trip. In spite of wet, sticky snow they were able to reach Garfield Shelter and climb Mt. Garfield.

On the Franconia Ridge traverse in early March the impossible finally happened. One of our most experienced and resourceful climbers forgot his snowshoes and, after a short but valiant attempt to proceed without them, was forced to make the supreme sacrifice and re-

turn to his car. The rest of the party, saddened by the misfortune of their comrade but spurred on by their leader, Dick Judy, climbed up the Flume Slide Trail, kicking steps on steep, open snowslopes under a brilliant sky. After going over the summits of Flume and Liberty we set up our tents on the ridge a little short of Haystack. A sleet storm during the night iced them up a bit but we were able to knock off most of the ice before packing up the tents to continue on over the exposed portion of the ridge, in thick mist and wind. We arrived on the summit of Lafayette simultaneously with two other climbers who sprang at us out of the fog from the other side. After a leisurely lunch at Greenleaf Hut we continued our descent along the Old Bridle Path to the road.

Dave Sanderson led the final trip of the season into the Carrigain region. Ten of us plodded up the Sawyer River road, dropped our camping gear at the stream near the junction of the Signal Ridge and Carrigain Notch Trails, and then went on to climb Carrigain in perfect weather. We returned to camp shortly after dark, set up tents, cooked supper, and ate a leisurely meal. Since the leader didn't crawl into his sleeping-bag until rather late, the standard wake-up time was ordered dispensed with and we were allowed to sleep until 5.30 a.m. The next day was to be the last climb of the season, a bushwhack of Mt. Lowell by the southeast ridge. We started by walking about half a mile up the Carrigain Notch Trail and then cut off to the right and climbed straight up the side of the ridge to its crest. The ridge was followed to the top. A number of false summits added to the fun and the views to the east and also toward Carrigain became more frequent the higher we climbed. Just short of the summit an open viewpoint on the edge of one of the cliffs which fall into Carrigain Notch showed us the final steep climb. A cliff was skirted by pulling ourselves up through thick growth to the side and we found ourselves on the summit, four hours after leaving camp. A few feet beyond was the open alpine meadow where Charlie Fay and I had eaten lunch last summer, after bushwhacking over from Norcross Pond via Mt. Anderson. The view was truly magnificent: one thousand feet straight down through our snowshoe webbing was Carrigain Notch, while directly facing us stood majestic Carrigain with its snow-covered Signal Ridge on the left and Vose Spur in front. The knowledge that this was a view few had seen detracted little from its enjoyment.

ROBERT L. COLLIN

Winter ascents of the 46 four-thousanders of New Hampshire have been completed this year. "Winter" was defined by the almanac—this year, for instance, winter ran from 3.27 p.m. on December 21, 1960, to 3.32 p.m. on March 20, 1961. "Winter conditions", "snow on the ground", or similar definitions, we feel, are not satisfactory.

ROBERT L. M. and MIRIAM UNDERHILL

Winter Leadership Clinic. I was sitting in the dining room of the A.M.C. Pinkham Notch Camp one evening early last February when George Hamilton, manager of the hut system, burst in to announce

that two men were long overdue at their base camp after a day of climbing. Their companions had just called on the emergency phone system, stating that they were too exhausted to begin a search effort. Bill Putnam, A.M.C. Mountain Leadership Committee Chairman, immediately began to organize a rescue party.

The emergency was a sham! I was attending the first A.M.C. Winter Leadership Clinic, sponsored by the Mountain Leadership Committee, on February 3-5. The mock rescue was part of a program designed to help those who attended learn from instruction and from experience how to lead successful and enjoyable climbing and camping trips under winter conditions.

The clinic's eighteen-man faculty, as impressive for their wit as for their collective mountaineering experience, represented the A.M.C., the Adirondack Mountain Club, the U.S. Forest Service, and the New Hampshire Fish and Game Commission. To a student body of twenty-eight, this staff set a furious pace in an effort to cover the ambitious program that had been planned.

In lecture and discussion sessions Friday and Saturday evenings, and in reading assignments, we considered problems of trip preparation, equipment, winter conditions and emergencies. We discussed the critical responsibility of the leader to know: to know his group members insofar as possible, and the relationship between this knowledge and flexibility of the group's objectives (that as the former is minimized, the latter must be maximized); to know the party's equipment and its limitations; to know that others know where the group is going, and that it will go there; to know the terrain; to know the weather forecast and snow conditions, and their effect on the trail; to know that food is sufficient and that liquid intake will be adequate; to know first-aid and the symptoms of physical disability; to know basic camping, mountaineering and rescue techniques; to know that what he knows may well not be enough!

An all-day field trip on Saturday drove home the significance of much of this information. Divided into small groups supervised by members of the staff, the students were each in turn given an opportunity to lead their group and to deal with emergencies conceived in the devious minds of the accompanying staff. Sunday was spent touring the Pinkham Notch landscape while the staff demonstrated the intricacies of snow-cave construction, winter bivouacs, stretcher improvisation, use of map and compass, and winter tenting. A discussion of these arts and a general summing-up brought the clinic to a close.

Perhaps my most lasting impression is that, by contributing time and effort, all these people—staff and students—underscored their concern that mountain country be properly understood and that those who venture into it be adequately prepared.

K. GERALD MARSDEN

Progress on Homemade Tents. Due to the nearly prohibitive cost of good winter or high-altitude tents many Club members have in recent years taken to making their own. The one I completed this December was an elaboration on a double-walled tent made by the Editor last year. It is similar in design and dimensions to the Himalayan tent

made by Gerry, in Boulder, Colo. It is A-shaped, with a vestibule at one end, and is set up with two A-frames and two pairs of wands. The outer fabric is a tight 2.2-oz. dacron, the floor is 3-oz. horcolite (plastic-coated nylon), and the inner wall is of cotton balloon cloth. As all the equipment is stored in the vestibule, the 5'x7' sleeping space is comfortable for three and very luxurious for two. The weight, complete with poles and fiberglass wands, is 8¼ lbs.

On the first cold night after the tent's completion it was tested in our backyard in Cambridge. Certainly its warmth was remarkable: only minutes after starting my Primus the inside temperature had risen to 130 degrees! Later more careful tests showed that with an outside temperature of 0 degrees an inside one of 145 can be maintained. Also, long after the cooker has been extinguished the warmth of the occupants will keep the tent well above the outside temperature. A differential of 20 degrees has been consistently observed in the morning. By lighting the cooker while still in my sleeping-bag I have been able this winter to avoid entirely the gruesomeness and low morale so often associated with early-morning winter starts.

In January two of us pitched the tent high on Jefferson's Castellated Ridge, where we spent a very pleasant night. The next day we climbed Jefferson in somewhat foul weather. Several weeks later I was weathering a respectable storm above Mt. Pleasant during the Harvard Mountaineering Club's annual traverse. Although the tent flapped, it allowed us to cook without any trouble, and subsequent inspection revealed that no weakening had taken place. On other occasions it has been pitched among the Howks on Mt. Madison, rained on in the Mahoosucs, sleeted on near Mt. Liberty, and set up in Huntington Ravine. Although it seems to be fairly successful in short rainstorms, it is not really a wet-weather tent. I am already working on another to solve that problem!

CHRISTOPHER GOETZE

ROCK CLIMBING

Some New Routes in the White Mountains. *Mt. Huntington.* In the spring of 1960, Leif Norman Patterson and I did a route on Mt. Huntington, which lies on the west side of the pass on the Kancamagus Highway. The route lies in the center of the cliff, to the left of a big, red area. It was very disappointing, for the granite of the cliff is granular and rotten, especially in the red area, and the route was either too easy or too hard. Two or three pitons were used for artificial aid; descent was by rappel, to the left of the ascent. The bush at the top of the cliff is very thick.

Cannon Cliff, The Lakeview. At the extreme north end of Cannon Cliff, above Profile Lake, is a small buttress of blocky granite, with granite arches to its left. On May 28, 1960, Brad Giddings and I started up the arches, about 70 yards south of the buttress. We diagonaled right at first up to a bush (60 ft.), and then left up slabs (piton); then a few steps to the right to a retable, and left again up slabs a few yards to the first belay stance (pitons). The second pitch goes up about

40 feet to overhangs and then traverses to the left and up, underneath them, using underholds and friction technique. The third pitch is similar (pitons). The granite is of good quality on this section of the cliff. From the end of the third pitch the climb stays at the lower edge of the bush line until it arrives at the indentation at the left of the arch area, near Wiessner's route, and then goes up to, below, and a little to the left of the Old Man (several pitches are easy Class 4). The original exit of the route was below the Old Man, to the right, but this is not a satisfactory ending. On July 10 Arnold Guess and I finished the climb by using the upper portion of Wiessner's route, the top of which goes up the left of the two *verschneidungs* at the left of the Old Man. The pitch below this goes up the steep, massively cracked granite below the two *verschneidungs*. To my knowledge, Wiessner's route has long been neglected and deserves much more attention, for the climbing is interesting and the rock is good. Wiessner's *verschneidung* starts in an unusual way, using Mummery-crack technique. The "Wiessner-Lakeview" route is long—eleven pitches with a 140-foot rope, many of them using almost all of it.

White Horse Ledge, The Echo. Viewed from Echo Lake, White Horse Ledge presents two large faces, the right-hand slabs and the steep left-hand face surmounted by overhangs. In the center, between these, is a tremendous, arch-shaped overhang. On July 3, 1960, Bob Jahn and I succeeded in getting off the ground under the right side of this overhang. The climb starts on a bit of rock, shaped a little like the prow of a flat-iron, sloping into the earth. Ascend a few yards to an overhang, and put angle pitons in a dead-end crack on its left end. Take two thin steps to the right and retable to a good ledge. Thence ascend straight up to 40 feet below the interior of the huge overhang (piton). Descend a few steps, and traverse up and to the south on friction, with two ledges enroute (piton), to a ledge under the overhang, near the south end. Go around the end of the overhang and up an inside corner (friction, one rope-length) and part of a rope more to a very large ledge with trees. Exit from the ledge on the north end by an easy lay-back, with a belay from a cave (piton). One and one-half pitches of scrambling through trees brings one to the base of a lichen-covered, bare slab (directly above the overhang), a 4th class pitch. Our exit to the top was by rotten rock on the upper left of the slab (hard 4th class), but it would probably be better to go through trees to the right and finish on friction slabs.

A wedge and a thin-blade piton are useful in the first three pitches. A 140-foot rope was used.

EARLE R. WHIPPLE

SKIING

Climbing the Wildcat. After a leisurely morning I finally arrived at the mountain at quarter of three in the afternoon, not much more than an hour before closing time. Since it seemed hardly worthwhile getting an afternoon ticket, I started off on foot, skis on shoulder, to walk up the practice slope. The afternoon was clear and a little windy, but not really cold. As I looked back across the valley, the Presidentials

cut a clear line against the March sky. The usual wisp of windblown powder drifted from the summit of Washington, giving the effect of a slightly steaming volcano. The snow was in good shape on the slope, with packed powder on the side and farther out the ever-present moguls casting long shadows downhill. It was a busy place, too—school vacation week and lots of kids of all ages employing the latest techniques.

I had gone about a third of the way up, walking on the hard snow by the woods, when there was a flash of blue parka and a plume of powder in the sunlight. A good-looking lad of sixteen or so came to a well-executed stop just above me.

"Are you all right, sir?" he asked solicitously. I said I was and asked if everything was all right with him. "I saw you carrying your skis and wondered if you needed any help?" he continued. I thanked him and said that I didn't need any help right now. So he started off again, hopping off the tops of the bumps as he went.

I climbed on at a leisurely pace—halfway up, then three quarters of the way. Most of it was below now, and an ever expanding view back.

I kept stopping to turn and look. You can't really see much from the gondolas, and coming down I'm generally too busy to do much viewing. (You will, I am sure, understand that there are exceptions in this era of stretch pants and such.)

However, I had again become an object of suspicion, for just then an older lad came traversing across and pulled up nearby. "Have you had an accident, sir?" he asked kindly. I said I hadn't, and asked if he had, as he looked tired and his shoulders and hair were covered with white stuff. He said, "No, I'm all right, but I thought there must be something wrong when I saw you walking up the slope". I explained about the afternoon ticket and that I liked walking once in awhile anyway. He said, "Well, that's all right if you like it; not many people do", and he was off again.

By this time I was beginning to realize that a lone figure walking so far up seemed to be an object of interest, if not sympathy. This was verified again about halfway up the chute which leads down from the top of the traverse on the main trail. At this point I was politely approached by another lad who said, "Sir, you arouse my curiosity. I saw you walking up the practice slope on my last trip down, and here you are still walking. Do you mind explaining?" I said I didn't mind. I told him about the half-day ticket and liking to walk and all that stuff. He thanked me politely and said he guessed there might be some fun walking uphill carrying your skis, but he would rather ride. He skied away looking very competent and as steady as a church—but much faster.

I started up again. This was the drop before the long traverse where we used to try to build up a head of speed in a race. That was before the improvements and it was much wider now, with many more bumps. I recalled the day when Charlie took the inside route over the rock in eighteen inches of new powder. He had ended up looking like one of the paddlewheels on the *J.T. Morse*, only going much faster. Again taking after the same paddlewheel, Charlie stopped after about five revolutions. He shook himself, roaring with laughter, and went on down the trail.

A little farther along, about where the Needle's Eye used to be, I was startled by a shouted greeting, "I might have known any old fool walking up the trail would be somebody I'd know". I elevated my gaze to the face of a large character who hadn't shaved that morning or maybe the morning before either. This bit of warm cordiality led to ten minutes' more rest, and reminiscences of good times on the old "Cat" when we had sometimes made four complete runs in a day—walking up.

I kept going, as there was plenty of daylight left, stopping now and then to talk with a friend on the way down. At Sun Valley, just above where the Z-turn used to be, I was joined by one of them. We moved along unhurriedly, enjoying the slanting sunlight and stopping every now and then to have a long look back across the Notch. The far view looked familiar, as it has since those days in '34 when I had first been introduced to the new-cut trail.

To the left was the Gulf, with its long slanting fingers reaching into the dark spruce below. Then came Boott Spur, thrusting out almost into the foreground; and the Ravine, its smooth snow flowing down the gullies and over the Headwall. After that appeared Raymond Cataract, at the terminus of a giant funnel, and then Huntington—the whole spread before us in a breathtaking panorama. Above all rose the cone and the high snowfields leading to the summit, now touched pink by the late afternoon sun.

To the near view the trail above Sun Valley was still recognizable as the old Wildcat, though wider at every point. The long, fast corridor with its gradual right turn is wide enough now to allow short traverses if you feel like it. It used to be about the width of a narrow country road.

Coming down out of the glade above and the two turns straight from the top, you would hit the corridor fast. If you wanted to check here you stemmed a little, usually without any noticeable effect. If you didn't care for this maneuver you took it as it came, planning to lose some speed by slipping down the drift on the right at Sun Valley. Then you were plunging on down the Z-turn, side-slipping a little there too if you wanted, and then on through the Needle's Eye.

If you made it as far as that, and could negotiate the sharp left at the lower edge of the glade below, you were all right across the traverse—if you didn't relax. After that came a sharp drop, a left, and a steep traverse to the final glade after the lower toboggan shelter. Only one hazard now, a fast left gullied out into a deep groove most of the time. If you could hold this one you had it made on down to the timer's hut and the finish line.

We kept on up the trail and soon two familiar figures hove in sight from above and pulled to a stop nearby. My two boys had been on the last gondola and were getting in their final run. They climbed back up with us and broke trail to the top of the old racecourse, not noticing the "Trail Closed" sign, while I waited with Jim below.

Together finally we dropped down, rather easily as this was the "next to the last" run. It is our custom never to have a last run as that's when the accidents happen. We were all enjoying every

moment of it. The old Wildcat feeling welled up from somewhere, and the thrill was there the way it used to be, and was shared alike by the young and the not so young.

DANA HINCKLEY

ACCIDENTS

Search for a Small Airplane. On August 19, 1960, during a violent thunderstorm in the late afternoon, a light, single-engine airplane on a routine return flight from Montpelier, Vermont, to Manchester, New Hampshire, was reported missing near Mt. Kearsarge, Warner, N. H. A search was organized immediately but inclement weather conditions prevented an expeditious start. Several reports started to filter into state police headquarters at Concord as residents of the area gave accounts of hearing distressed aircraft circling overhead during the storm. As news of the search spread it became quite evident that many such reports were false and just hoaxes or attempts at publicity. The sudden rush of rumors was climaxed by the placing of false wreckage about the state by unknown pranksters, causing undue time and money to be wasted while these were checked out.

Search operations continued throughout most of August but were finally confined to weekends by volunteers and families of the lost passengers. The aircraft, which had left Montpelier about 2 p.m. on a direct course for Grenier Field, Manchester, was believed to be down in the Mt. Kearsarge region, as this peak lies in almost a direct line between the two cities and is a guiding landmark to planes flying this route. So searching, for the most part, was concentrated in this area. However, it was not known whether or not the plane had remained on course, as no radio contact had been maintained during the flight.

Those aboard were Charles MacFarland of Woburn, Mass., and Oliver Newcomb of Wilmington, Mass., both First National Food Stores executives, and William "Doc" Martin, well-known veteran pilot of Concord, N. H., and owner of a flying service. The airplane, owned by Martin, was a red and white Piper Tripacer which was built to carry four passengers. Martin had established a thirty-year safety record in flying.

On Sunday morning, November 6, I received word that on a routine flight over the area two Civil Air Patrol members, Roger Hebert and Theodore Furus, both attached to the Hooksett, N.H., CAP Squadron, had seen what appeared to be wreckage on the S.E. slopes of Mt. Kearsarge, about 900 feet below the top. This report was confirmed shortly afterwards by Gordon Bunker of the N.H. State Aeronautics Commission, who flew over the area and identified the wreckage by the number on the wing. A search party was already assembling at the summit of the mountain under the direction of N.H. Fish and Game District Chief Henry Willey of Penacook.

The ground-search crew left the summit at 2.10 p.m. and kept in constant touch by portable radio with the planes overhead which were directing them to the exact spot. Starting in from Cilleyville, Fish and Game District Chief Ernest Melendy had, with a jeep, reached a point where an old logging road met Bradley Brook which flowed off the

N.E. side of the mountain, and from this point started another crew up the long approach.

The airplane was reached at 2.40 p.m. MacFarland was found pinned in the wreckage; he had been covered up by both Martin and Newcomb, as their coats lay on top of him. His seatbelt had been released. A short while later Martin was located at a point about 100 yards E. of the airplane at the edge of Bartlett Brook, a tributary of Bradley Brook. He had apparently attempted to apply tourniquets to himself in an effort to stop severe bleeding. While the bodies were made ready for transport off the mountain, search was continued for Newcomb, the third passenger. However, as darkness closed in, further search outside the immediate area of the plane was curtailed.

The following morning, Monday, we started a systematic search of the entire area. Our group made the descent off the east side of the mountain toward the wreck. Going was slow and tough, due to the immense growth of scrub pine and much windfall.

After reaching the wreck, at 11.40 a.m., we once again made a search of the immediate area. The plane was rolled over and the underside examined in an attempt to locate Newcomb. It was apparent that either Newcomb or Martin had attempted to start a fire. However, the papers, maps and log sheets, used for kindling were still folded and burned only at the edges. The first-aid kit had been opened, probably by Martin, and several makeshift bandages were spread on the ground. Found also was a flare gun near the left wing, alongside six rocket-type flares, none of which had been fired. Although the aircraft was badly damaged the cockpit remained pretty much intact. However, the instrument panel had been forced back somewhat due to the impact of the engine as the plane hit, and broke off, a large tree. At the writing of this report no decision has, as yet, been rendered as to the cause of the crash. Evidence was found, however, that showed the craft to be under full power at the time of hitting the tree and crashing into the ground. Since then, I have been told that there was no evidence to indicate any mechanical trouble and it can be reasonably assumed that the plane merely plowed into the mountainside in the fog, as the pilot (Martin) could not see it.

When it became evident that Newcomb was not nearby, the crew was ordered to search systematically the ground between Bartlett and Bradley Brooks, which ran almost parallel for some distance downhill. Then the search was continued to the E., then N.E., following the general course of Bradley Brook. At the point where the brook joined the old logging road where Chief Melendy had been with the jeep, we again split up into smaller teams. When it finally began to grow dark and the search was about to be called off for the day, the report came through that the team which had gone toward Wilder Pond near West Salisbury had found the third victim. They radioed that they were starting out with the body and would need assistance at the other end. We hurried around to West Salisbury and started up to intercept them. However, the night was now totally dark and we had great difficulty in reaching the other party by radio. They did not see our signal fire and it was, in the end, only when we started our chain saw that they could tell in which direction we were, and we could finally join.

Later the autopsies showed that MacFarland suffered multiple broken bones, including both legs, internal injuries and bleeding. He undoubtedly died instantly or shortly after the crash. Martin had no obvious fractures, but great internal bleeding; he probably did not live very long. Newcomb had no obvious fractures but great internal bleeding. He probably died of this bleeding, shock and exposure, after living through the night or at least well into it. His injuries were such that he could not have walked out. It must have taken every ounce of energy to crawl the distance he did, in pain. The medical referee and I feel now that Newcomb waited until Martin was dead before starting, as the flares were not used. This also leads us to believe that Martin was not able to communicate with Newcomb, as otherwise he would most likely have instructed him in the use of the flares. Martin was much more safety-minded, as were all the pilots, after the Miller-Quinn crash.

MALCOLM TAYLOR, *Trooper*

TRAILS

New England Trail Conference Report on Trail Conditions. Because the annual meeting of the Conference occurred after the publication deadline for the June APPALACHIA, the following trail report is based on material submitted to the secretary by various trail-maintenance organizations during February. Although the material received is therefore incomplete, it is hoped that this information regarding specific trails may be of value to walkers planning trips during the 1961 season. They should take into account the fact that most of these reports describe trail conditions as of last summer or fall and do not, in most cases cannot, yet tell of damage caused by winter storms. Those desiring more complete information may secure from the secretary, for 15 cents, the 1961 edition of *New England Trails*, a summary of the trail reports given at the New England Trail Conference on April 8.

The Maine Appalachian Trail Club and its affiliates, which maintain the AT from Katahdin to Old Speck, report that the trail is on the whole in good condition, with no known extensive winter damage. Most of the trail received routine maintenance last summer, and the following sections, the condition of which had become very poor, were restored to standard again by intensive reclearing: Yoke Ponds to the top of White Cap Mountain; from the Kennebec River over Pleasant Pond Mountain to Moxie Pond; from Pierce Pond over Bates Ridge to East Carry Pond; from Stratton Brook Flowage to the Horns Pond on Mt. Bigelow; and from Orbeton Stream to Saddleback Mountain fire-tower. The extensive Gulf Hags side-trail, uncleared for a decade or two, has again been restored to good condition. More than thirty signs, including viewpoint signs, were installed throughout and the trails were extensively blue-blazed. All spur-trails are now painted a two-color stripe, blue and yellow, so they may be easily distinguished from the through trail. This outstanding scenic area is once again accessible to trampers. More work is planned this summer on the Pleasant River Road, which may be used as a return route from the head of the Gulf.

During the past two years a new type of board direction-sign with cut-in lettering has been introduced on the AT in Maine and will

gradually replace the former stenciled signs. Last summer the Grafton Notch Lean-to received a new asphalt-shingle roof and minor repairs were made on the Sugarloaf Lean-to roof. In 1961 the Maine Appalachian Trail Club plans to build a new lean-to to replace the old Poplar Ridge Lean-to, and Pine Island Camp plans to build a new lean-to at a better location to replace the old Pierce Pond Lean-to.

The Appalachian Trail from Rangeley Saddleback Mountain to Andover B Hill Road, maintained by the Bates College Outing Club, is in good-to-excellent condition all the way through, except for a few side-trails, which are passable but not in excellent condition. Among the latter are the side (blue-blazed) trail to C-Pond Bluff, and the trail which goes around the bottom of Bemis Mountain. Heavy logging operations are in progress for about the first 4.2 miles of Section 22, reckoned from north to south. Last fall a trail was made and marked through the slash, but it is possible that continued logging operations have obscured the trail again. Logging roads in this area have been bulldozed along the trail for approximately 2 miles in the vicinity of Squirrel Rock Lean-to, which now looks out onto a broad expanse of beautiful shimmering mud, broken here and there by the tracks of some busy bulldozer scurrying about its work. Therefore the Bates College Outing Club hopes to move the Squirrel Rock Lean-to to C-Pond. Other future trailwork will consist of normal maintenance on main trails, minor repairs on lean-tos, and opening up completely the side-trails not presently in good condition.

The Phillips Exeter Academy Outing Club expects to go over its trail on Mt. Tumbledown in Weld, Maine, in May to do any work that may have accumulated since the trail was last worked over in May 1959, when it was left entirely clear. The work party will also check on a rung on the "loop trail" reported missing.

The trails over the mountains around Camden have been worked over by Boy Scouts and several summer residents. The Camden-Rockport Chamber of Commerce reports that improvement is slow but steady, and that much more help is needed to bring the trails up to the desired standard.

Approximately 125 miles of trails, ranging from easy graded walks to difficult mountain trails traversing rock ledges, are maintained by the Forest Service in Acadia National Park on Mt. Desert Island. Maintenance work on these trails begins in early spring and continues until all trails have been completed. Trail intersections are signed, and trails crossing open areas are well marked with cairns. Walkers are urged to stay on the trails, as shortcuts on hazardous mountain slopes can result in serious accidents. Those qualified may apply at Park Headquarters in Bar Harbor for rock-climbing permits.

In New Hampshire the Appalachian Mountain Club reports that all its trails as listed in the 1960 *White Mountain Guide* were open and passable last September. The White Mountain National Forest's 650 miles of trails will receive their usual maintenance this year.

The trails in the Cold River valley, under the care of the Chatham Trails Association, are kept in reasonably good condition by volunteer help from Cold River Camp guests and occasional hired workers.

The Randolph Mountain Club reports that its trails in Randolph



Harold Orne

EMILY KLUG, ABOUT 1930

(See page 422)



NEW SUSPENSION BRIDGE OVER THE PEMIGEWASSET EAST BRANCH

Photos by U. S. Forest Service

(See page 403)

valley and leading up to the summits were well cleared in 1960 and should be in good condition for this summer. A new bridge was built over Snyder Brook, where the Randolph Path and the Brookside cross, to replace the one carried away by the 1959 flood, and other bridges were repaired.

The Hutmen's Trail, well described in the 1960 A.M.C. *White Mountain Guide*, was cleared in July 1960 and will be thoroughly gone over again this year, probably in May and not later than July.

The Dartmouth Outing Club reports that its 81 miles of the AT from Barnard Gulf Road in Vermont to Kinsman Notch, plus various side-trails, were in good condition as of last fall, having been cleared and marked with orange and black during the summer of 1960.

The Sub Sig Outing Club has completed the reopening of the Sleeper Trail, which extends between Mt. Tripyramid and Mt. Whiteface in the Sandwich Range, and has posted permanent signs.

The trails on Mts. Paugus, Passaconaway and Whiteface, maintained by the Wonalancet Outdoor Club, are all in good condition, except for the Mexico Ridge Trail, the victim of lumbering and blowdowns. The Gleason Trail on Sandwich Dome, though still listed as a W.O.D.C. trail, is currently maintained by the N.T.O. group of the A.M.C.

All the trails on Grand Monadnock and in the Lost River Reservation are well maintained by the Society for the Protection of New Hampshire Forests. Maps can be procured at Monadnock State Park.

At various times in the past two years, parties from the Worcester Chapter of the A.M.C. have cleared parts of the Wapack Trail, particularly from Mt. Watatic, where several badly grown-in spots were opened, over the Barretts to Wapack Lodge. Last October a group went over the entire 21 miles of the Wapack Trail and found it passable.

In Vermont the Green Mountain Club reports that the Long Trail could be classed as good or better for most of the 255.3-mile length, as could the rest of the Long Trail System, whose mileage totals 425. It is reported that the Juggernaut Trail, a side-trail leading from Killington Peak to West Bridgewater, needs further marking. The shelter system, comprising nearly 60 shelters, camps and lodges on or near the Long Trail, was all in good condition last year. The old Breadloaf Shelter was replaced last year by a new Adirondack-type log shelter, named the Emily Proctor Shelter in honor of a prominent early member of the G.M.C.

The Green Mountain National Forest, which maintains 162.4 miles of trails in the National Forest, including parts of the Long Trail and side-trails, reports that its trails are expected to be in generally good-to-excellent condition this spring, with the five shelters in the Central Ranger District in safe, usable condition. During the past year many new signs were erected. A new roof has been added to the Griffith Lake Shelter and the trail from that shelter to Griffith Lake has been relocated and new footbridges installed. From Griffith Lake to the Old Job Shelter several worn-out footbridges have been replaced, treads restored, and waterbars installed. Since the necessary funds were not appropriated, the suspension bridge over Big Branch Brook near the Danby Road could not be reconstructed. The Forest Service cautions

walkers to observe the warning signs and bear with them. The bridge has been redesigned and will be reconstructed sometime after August in 1961, it is hoped. Also, if funds are available, the Service plans to reconstruct the bridge to the Little Rocky Pond Shelter. Other Forest Service plans for this year include opening the entire Long Trail and side-trails this spring and doing some special heavy brushing on the Long Trail from $\frac{1}{2}$ mile north of Skyline Lodge to $\frac{1}{4}$ mile south of Mt. Wilson, and relocating a $\frac{3}{4}$ -mile section of the Trail $1\frac{1}{2}$ miles north of Mt. Grant.

In Massachusetts the Metawampe Club reports that its entire section of the AT, from Tyringham to Washington Town Hall, was polished very carefully in 1960, and is in excellent condition. The few blow-downs were removed, brush cut back, and the whole trail re-painted.

The Mt. Greylock Ski Club reports that its section of the AT, from Washington Town Hall to the Vermont line, was cleared and the blazing renewed, where needed, last summer. The relocation near Dalton has not been completed.

The Mount Holyoke College Outing Club reports that the purchase of land and subsequent building of a cabin on Mt. Holyoke has stimulated interest in the trails there and some definite action on trail maintenance is expected this spring.

The Worcester Chapter of the A.M.C. reports the Jack Frost Trail on Mt. Wachusett in good condition. Though not responsible for these trails, the Chapter has done some work to make passable parts of the Old Indian, Mid-State and Harrington Trails on Mt. Wachusett, in order to maintain an east-to-west trail over the mountain, from Redemption Rock on Route 140 approximately five miles to the Harrington Farm. Conditions along other sections of these trails is not known, and is probably not good.

The Massachusetts Department of Natural Resources has a number of additions to make to the camping information in its pamphlet on the State Forests and Parks. Camping facilities will be available in 1961 in Clarksburg State Park and Shawme-Crowell State Forest. A new camping area in the Pearl Hill Brook section of Willard Brook State Forest will open in 1961. Camping facilities are now available in Erving State Forest and in the Parker Brook area in Pittsfield State Forest. There is a new camping area on the north side of Cold River in Mohawk State Forest, and in Beartown State Forest a small camping area is located on the shore of Benedict Pond.

In Connecticut all blue-blazed trails except those which are side-trails to the AT are maintained by the Connecticut Forest and Park Association, which reports almost all in good condition. Short sections on a few trails have been abandoned because of housing developments, and the Pootatuck Trail north of Bridgeport has been given up. Two new trails near Voluntun have been completed—the Nehantic Trail and the Pachaug Trail. Maps of these new trails and many other trails, including the Metacomet Trail in Massachusetts, and new trail descriptions will appear in the latest edition of the *Connecticut Walk Book* (price as yet undetermined) to be published this spring by the Connecticut Forest and Park Association, 322 North Main Street, Wallingford, Conn. Those wishing to have up-to-date information about trails

in Connecticut should obtain the state highway map published each year and available by May 15 from the Connecticut State Highway Department, Hartford, Conn.

The Connecticut Chapter of the A.M.C. reports its sections of the AT all passable and in good condition. The AT from Lion's Head to Bear Mountain summit has been blazed and painted. Race Brook Falls Trail, from Rte. 41, Sheffield, Mass., to Race-Everett Mountain Col (AT), has been reopened and axe-blazed. The Mattahessett Trail has been reblazed and brushed from Rte. 77 to Rte. 79. This trail will be reblazed and brushed from Rte. 79 to Miller's Pond in the near future. The trails in the Bear Mountain area are also scheduled for some attention.

In Rhode Island about 30 miles of trails in the southwestern part of the state are maintained by the Narragansett Chapter of the A.M.C. and are reported in good condition. The Nehantic Trail in Connecticut has been connected with the Rhode Island trail system just north of Beach Pond. The Chapter plans this year to put a new bridge over a stream at Camp Yawgoog and to make a new trail from Beach Pond to the Ledges picnic area. As its present supply of trail maps is nearly exhausted, the Narragansett Chapter expects to have a new up-to-date map in the near future.

We repeat that almost all organizations reporting on the condition of trails under their care have emphasized that their information is as of last fall, and that at the time of writing it was impossible to know what damage if any the winter storms have done to trails and shelters. Walkers going into areas where there was heavy snow are cautioned to make local inquiries about trail conditions, especially if they are going early in the season, before trail crews have had a chance to go through to take care of any damage.

Several trail-maintaining organizations mentioned the need for more volunteer help in keeping their trails in good condition—and several college outing clubs and Boy Scout groups have offered aid. Sometimes distance makes it impossible for those needing and those offering assistance to get together, but if the twain do not happen to be in the same general area, the New England Trail Conference will be glad to refer any willing volunteers to organizations which have requested assistance.

EDITH M. LIBBY, *Secretary, N. E. Trail Conference,*
26 Bedford Terrace, Northampton, Mass.

New Trail Bridge in the Pemi. A construction crew of the White Mountain National Forest completed the installation of a 180-foot suspension trail bridge across the East Branch of the Pemigewasset River on the Wilderness Trail last September.

Constructed of pre-cut treated pine and fir, the 3-foot catwalk with 42-inch-high guardrails is suspended from overhead cables by steel hanger-rods attached to catwalk cross-members. Twenty-five-foot-high towers on each bank provide the necessary elevation for the overhead cable. The catwalk is some 26 feet above the stream, which is about the same height as that of the old trestle.

Walkers formerly crossed the river at this location on the old "Camp 17 Trestle" railroad bridge built by the J. E. Henry & Sons Co. in 1908. The loss of the old railroad trestle as a foot bridge created a potentially hazardous river-bed crossing. The protruding stones necessary for stepping places were rapidly and easily inundated by shower run-off from upstream watersheds. Walkers could suddenly find themselves cut off from their day's destination and faced with an unplanned intermediate overnight stop, several miles of detour, bushwhacking, or a risky water crossing.

Initial consideration of a way to avoid these inconveniences and hazards brought the suggestion of relocating the trail to put the water-level crossing at a more favorable place. But the nature of the East Branch would have forced the shift of such a crossing so far upstream that the entire trail pattern would have been unfavorably disrupted. When the old crossing had been accepted as the key location, the present bridge was designed and construction was started in the summer of 1959.

During this past winter downstream winds along the river reached high velocities and caused the bridge to sway violently. The same type of swaying some years ago caused the Tacoma Narrows Bridge to collapse. This bridge, however, did not collapse but merely started to move off one of its abutments. The situation was discovered in time, in late February. By early March the bridge had been jacked up, got back into position, and had sway cables installed.

KENNETH I. SUTHERLAND

District Ranger, U.S. Forest Service

SCIENCE

How Glaciers Move. A laboratory model illustrates basic principles of glacier mechanics.

What is Observed in the Field. Early observers in the mountains of the Alps were understandably puzzled by measurements of surface movement on glaciers which revealed that the solid crystalline rock called ice "flows" imperceptibly downhill. Such measurements on glaciers have been gathered ever since Louis Agassiz's first recognition of this phenomenon a century and a quarter ago. Until very recently such movement has been considered akin to the "flow" of a rather viscous fluid. But since 1948 attention has been given to measurements of glacier movement below the surface and to the crystallographic changes involved in the ice itself. At first the picture was unclear, especially because of the revolutionary claim (later disproved) of some Swiss glaciologists and, several years earlier, by an American, Max Demorest, that deeper ice moves more rapidly than that at the surface. Demorest dubbed this type of movement "extrusion flow".

Recent investigations in the physics of plastics and of creep in metals have thrown much new light on this subject. Marked similarities have been found to occur in the deformation both of metals and of ice when near their respective melting points. What is more, field data have corroborated the laboratory results. The measurements have been obtained with the aid of tunnels and lengths of pipe installed in bore-



Michigan State University

TERMINAL AREA OF SCALE-MODEL KAOLIN GLACIER

Showing crevassing and overthrust structures developed by discontinuous fracturing



OBlique VIEW OF THE MODEL VALLEY GLACIER

holes in glaciers in the Alps and Alaska and by measurements of their subsequent deformation in response to the englacial movement. The results reveal that the deformation of glaciers conforms closely with the physical principles of plastic adjustment. Out of this has come a "flow law" illustrating not a *linear* stress-strain relation as in fluids, but an *exponential* stress-strain relation as in plastics.

What the Clay Model Demonstrates. The relatively large size of glaciers as viewed in the field, their slow rate of movement, and internal stress complications manifested by the presence of fractures have led investigators to experiment with different substances which might serve as laboratory models (e.g., tar, silicon putty, blanc mange, etc.). The most suitable is china clay (purified kaolin, a weathering product of feldspar). It was later found that the eminent British geologist, Tyndall, had used pipe clay (this same substance) over a century ago.

Wetted china clay, mixed in the ratio of approximately 1 part water to 2 parts clay, is found to "flow", or more correctly to "creep", in accordance with the basic law of plasticity. We have conducted a number of experiments on this in the geomorphological laboratory at Michigan State University, extending some tests which I had previously made in collaboration with Mr. W. V. Lewis at Cambridge University. As a result we found that laboratory-scale kaolin glaciers may be produced to demonstrate the "flow law". As in real glaciers, the clay model shows greatest movement at the surface, with progressively less displacement at depth, in agreement with a curve of exponential diminishment. Also it fractures and slides on its bed quite readily. Thus it combines all the gross modes of glacial movement, including both the *continuous* and *discontinuous* processes. It further simulates glacier movement by remaining fairly stationary, as the model is tilted, until gravitational forces acting downhill exceed the resistance or yield stress of the substance, causing it to creep. This, of course, shows the important effects of gradient as well as thickness—the two main parameters of the "flow law".

In this demonstration the kaolin is placed in a scale-model valley (see the photos). As one watches the material creep, "crevasses" and "over-thrusts" can be seen opening, and later closing, while some fractures remain visible. Slowly moving surface waves (bulges) can also be seen to form. Moraines and other related features can be developed by sprinkling dust or sand in appropriate sections. In short, much of the life history of a glacier, coupled with an excellent demonstration of the mechanics of movement, can be reproduced in one-fourth to one-half hour.

MAYNARD M. MILLER

HISTORY

Up Washington 100 Years Ago. (The late Miss Mary Johnson of Randolph gave Mrs. John H. Boothman a copy of this letter written by one of her ancestors in 1860.—Ed.)

Crawford House, 7. 12. 1860

My dear Sister Anna [Mrs. William Shipley],

We have just returned from Mt. Washington. We have laid aside

our horse-perfumed garments, and in silk gowns have seated ourselves in state in this grand drawing room. Martha is scribbling to one of her gentlemen correspondents. I wanted to write to thee, but don't see clearly how thee is to read it. Setting that difficulty aside, however, let me repeat, we have just returned from Mt. Washington. You people down in those level places can't pretend to know what that embraces, that sentence. The ascent and descent are perfectly awful in themselves.

We started about eight o'clock yesterday morning, dressed thus. Over our flannels, quilts and merinos, we tied our sintags—put on a monkey jacket, thick and warm such as porters and laborers wear about their work, then our shetland shawls, then our blanket dittos, a rigolette upon our heads and a coarse straw hat tied down with tape, bathing fashion.

Thus attired we mounted at the back door, Mr. Gibbs, the proprietor, and some half dozen others "getting us off".

Martha and I both rode astride upon gentlemen's saddles, and it was well we did, as the sequel proved. For the first two miles nothing happened; our route lay through the woods with fine firs and spruce trees on each side, ferns too, by the thousands.

Then as we came out upon a mountainside, here the wind began to blow, soon we grew cold. The wind rose to a gale, we were fairly in its power and we had nothing to do but to hold our shawls about us and bear it.

We were the only two ladies. Two guides were with us—one a good open-faced fellow, all kindness and simplicity, the other a splendid, tall, dark-haired man, a perfect specimen of physical perfection. Coming down today I wondered how many of the young ladies he had taken up had fallen in love with him!

He sits out there now, smoking a pipe, just opposite the window. Martha has given him a gracious nod, which he returns with a stately bow.

It grew colder and colder, all our clothing seemed a mere nothing, our guides were busy tucking it in as it blew about, comforting us with the remark that had we been on ladies' saddles our clothes would have been on top of the mountain.

The views we caught as we crossed one summit after another were fine, undoubtedly, but our faculties were frozen.

The last mile, crossing the dome of Mt. Washington, was terrible. The wind had increased to a perfect gale, which blew ladies in other parties from their horses; the cold was so intense that we didn't see the danger of the road but thought of nothing but our intense suffering.

The ride of nine miles at last terminated. Martha was lifted from her saddle, entirely helpless, and sat upon a stone trembling violently. A dose of brandy from the handsome guide brought her back.

We had a funny dinner in the "Tip Top House", about twenty I suppose at the table, parties from other houses. All provisions are carried up on pack horses and we paid accordingly \$4.00 a day apiece.

A good fire is kept up in the wood stove; fresh water, cold as ice, comes from a spring very near. It is a picture of utter desolation around—heaps of stones, no grass or green thing to be seen.

After dinner we had our view. It was too grand to speak of, we'll

only say that the wind was outrageous, you could not walk without being blown over. It was impossible to stay out in the cold long. All went down but a lady and gentleman and ourselves; we remained, hoping to see a sunrise and sunset. In both we were disappointed. The time after tea was occupied in telling stories.

We went to bed in a queer little room and wore our monkey jackets and shawls all night, it was so terribly cold. Lay awake a long time listening to the wind, you never heard such. If the whole broad ocean of mountains we had looked at in the afternoon could have been actually transformed to living water and had sent its billows rolling in to dash at the foot of our Mt. Washington, the roaring might have equalled it. It was perfectly terrible. But our stone house was bolted down to solid rock and never trembled.

We awoke at five. The sun had not risen clear and when we went out the banks of snowy clouds were rolling far beneath us. We watched the masses parting and blue valleys forming. You can't imagine the delight we felt.

After breakfast we explored Tuckermans Ravine. Such terrible climbing, hundreds of feet, thousands perhaps, hanging on to tree roots, letting ourselves down by branches, walking composedly through brooks, because there were no other paths. Starting loose stones down the mountain side. Then we rode [down over] Mt. Washington and all the other mountains, nine miles to our hotels.

We went in some awful places where our guides kept watch lest we should faint. Unfortunately we could not! The wind had gone with the night and we were able to see the danger that we had not heeded the day before.

Tomorrow we leave for the Profile House.

Affectionately, REBECCA

First Woman to Drive the Carriage Road?¹ In July of 1897, when I was 22 years old and had been married for two years to Vyrion Lowe, I drove a horse and buggy up the Carriage Road to meet him at the end of one of his guiding trips. He had taken a group of men—one of them was Dr. Harry P. Nichols, whom he frequently guided—across the Range from Randolph to the summit of Mt. Washington, where the men planned to go down on the Cog Railway. They told Vyrion they would pay for him to go with them, or if he preferred to have me come and get him they would pay the toll on the road. Naturally I was tickled to death to have this chance to go up Mt. Washington, since I had never been up there.

It was the summer after Glenn was born; I left him with Vyrion's sister, borrowed a horse and buggy from our neighbor Gene Hunt, and started off between six and seven in the morning. Although I had never driven this horse before, I was used to driving, since Vyrion, who had recently been shot in the hip, found it uncomfortable to sit on the driver's side.

Since the horse was pulling only a light buggy with just me in it, I

¹ This year marks the 100th anniversary of the completion of the Carriage Road.

made her trot right along on the level parts of the road, from our house to the start of the hill on the Dolly Copp road and, of course, along what is now Route 2.

Vyron had told me not to start if there was so much as one cloud in the sky. When I started there wasn't, but later some clouds appeared and as I reached the summit, just about noon, quite a thundershower came up. It didn't last long and as it got over in Maine, Vyron and I stood outdoors together, in front of the Stage Office, and enjoyed very much watching the lightning.

We didn't stay on the mountain long. On our way down Vyron, in spite of his hip, did all the driving. The buggy was just a little light thing for two people, meant to be used on the level, I guess, and it had no brake. We stopped at the Halfway House and fastened something to the wheels to hold it back. The road is steeper below the Halfway House, and we weren't hurrying at all.

I never realized that it was quite a thing for a young woman, all alone, to drive up Mt. Washington, until I told my father about it. He had driven up himself several times, to get one of his other daughters who worked up there, and he thought it was quite a trip even for him. When he heard I'd done it, he just couldn't believe it. But the only time I got a little mite nervous was just before I reached the summit; I heard the train coming. The horse had been frightened by a train near the railroad track down in Randolph and I wasn't sure what she'd do. But she never cared at all.

ETHELWYN (WINNIE) LOWE

The Landslide in Crawford Notch, October 1959. During the heavy rains of mid-October, 1959, a small landslide came down the face of Webster and almost reached the zoo at the Crawford Notch State Park. Only the deer were in their regular pens at the time. We'd been having so much rain and the water was getting so high I was afraid there'd be a real flood through where the pens are and had moved the smaller animals to higher ground over on the other side of the road near our house. I'd lug a crate of animals across the bridge, then on the way back I'd carry a big rock, to keep myself from being swept downstream. I put the bear under our house, the skunks in the shed. But even over there the animals got very much frightened by the noise. The little pine marten almost had a nervous breakdown and threw himself violently against the cage. (He came out of it all right.) But however frightened the animals were, the manager was a lot more scared still!

When I saw the slide fall, I happened to be standing outdoors on the farther side of the road—and I'd have gone even farther if I'd had any place to go. First I heard the noise; the roar was dreadful, like a lot of jet planes. The slide started about three-quarters of the way up Webster Cliff and followed the route of the old slide, routing it out deeper. Where the path of the old slide used to be broken rock, now it is down to bare ledge. The moving mass was 70 to 150 feet wide at the front and cut a swath to a depth of 15-20 feet. All the time I was watching it I was thankful that I'd led a good, clean life! The oddest thing was that the slide moved much more slowly than I had imagined

a slide could go, and sometimes just seemed to be hanging there. It took 12 minutes to get from the top to the base. A lot of rubble and silt, to a depth of 15 to 18 inches, was washed into the deer yard, apparently just pushed along by the water in the soil, with more water coming along behind it, but the main body of the slide stopped about 200 feet above and slightly to one side.

DONALD E. MITCHELL, *Manager, Crawford Notch State Park*

Thoreau on Katahdin. The question of how far Henry Thoreau ascended Katahdin still vexes readers of his book, *The Maine Woods*. His exact route is also in question, though anyone who admires Thoreau and visits Katahdin would like to see where it was that Thoreau climbed.

An article in APPALACHIA for June 1946—John W. Worthington's "Thoreau's Route to Katahdin"—is very helpful. But Worthington still leaves the questions in doubt, saying of Thoreau's highest point: "As to its exact location we are in about as much of a cloud as that which surrounded him" (p. 13).

However, it does seem possible, with the aid of the U.S.G.S. map of the Katahdin quadrangle, together with a firsthand investigation on Katahdin itself, to trace Thoreau's route fairly precisely and to determine his highest point.

Let us start with Thoreau's party at the point where the Abol Stream empties into the Penobscot River, the point at which Thoreau took command for the ascent, "at the mouth of Murch Brook and the Aboljacknagesic, mountain streams, broad off from Ktaadn, and about a dozen miles from its summit" (70).¹

Sizing up the situation without a previous knowledge of the shape of the mountain, Thoreau headed for what looked like the summit, that is, South Peak, the higher Baxter Peak not being visible from that point. He tells us that he headed

directly for the base of the highest peak. . . . This course would lead us parallel to a dark seam in the forest, which marked the bed of a torrent, and over a slight spur, which extended southward from the main mountain, from whose bare summit we could get an outlook over the country, and climb directly up the peak, which would then be close at hand (75).

The spur, it is obvious, is Rum Mountain, a 3361-foot shoulder just south of the 5240-foot South Peak. The torrent whose bed they noted is the east branch of Abol Stream.

The group started through the forest beside the Abol. They followed the north bank at first, but soon, "recrossing this stream, . . . struck at once for the highest peak, over a mile or more of comparatively open

¹Numbers in parentheses refer to *The Maine Woods*, Riverside Edition (Boston, 1893). The name "Murch Brook", as Worthington says, must have come from one of the party; the U.S.G.S. map shows that it must be what is now called Katahdin Stream. The "Aboljacknagesic" is the modern "Abol". Thoreau's "dozen miles" is a gross miscalculation: the summit is about five miles in a straight line, about six by their route. Part of the confusion about Thoreau's exact route results from his miscalculations of distance in this unfamiliar territory.

land, still very gradually ascending the while" (74). This, as so stated, is impossible. Abol Stream here flows westward, having swung in a large arc from its generally southeastward course, so that to cross it from the north bank would mean going away from the mountain. Either Thoreau omits mention of a previous crossing, so that they now *re-cross* to the north bank, or else (what is not at all improbable in the dense woods) they mistook a tributary for the main stream. At any rate, they must still be north and west of the Abol.

Thoreau had taken a compass bearing for South Peak and led his group directly northeast through the forest. They proceeded thus "seven or eight miles, . . . crossing a considerable mountain stream, which we conjectured to be Murch Brook" (77). It was not "Murch Brook" however, for that leads off northwest quite away from the area they were in; it was the ubiquitous Abol again, in its southeasterly course. And once again Thoreau is far off in his measurements: "seven or eight miles" would have taken them over the mountain and down the other side.

They toiled on up the slope, but then, seeing that time was passing, in order to be sure of water they swerved to the left of Rum Mountain and climbed in the ravine. They camped in this ravine, by the east branch of the Abol.

While his friends were pitching camp, Thoreau climbed on alone. Since he soon came out above the timberline, and since timberline is here at about 3800 feet, we can spot on the map accurately enough the point in the ravine at which camp was made.

Now he made his way "up the nearest, though not the highest peak" (81). This peak, the second he has mentioned, must be to the west of South Peak, since that is the peak they headed for the next day, "the right hand, or highest peak, which was not the one I had approached before" (83). If one is familiar with the mountain, or if one studies the U.S.G.S. map, it will be clear that the ravine up which Thoreau struggled points directly to Baxter Peak. He is now high enough to see Baxter, which is indeed closer to him than South Peak. But he cannot see that Baxter is the higher of the two. (The difference in altitude is only twenty-seven feet.) If the weather had been better, he would have topped Baxter Peak that day, but he was turned back by clouds and rejoined his companions in camp.

The next morning they all set out for "the right hand, or highest peak", that is, South Peak, but Thoreau was soon alone, as the others gave up and were left behind. Now, Thoreau tells us, he climbed "a mile or more" over the rocks until he entered dense clouds, and then "a quarter of a mile farther" before he reached "the summit of the ridge" (84). The distance could not have been that—his camp could hardly have been more than a mile from the summit—but it is close enough, together with his description, to make it clear that he came out, finally, on the ridge between Baxter Peak and South Peak. This ridge is the high point of his climb.

For Thoreau's own phrase, "the summit of the ridge", clearly cannot mean the top of the peak; he has used the word *peak* consistently to mean the highest point, and *summit* to mean the top generally. He was not on the tableland which spreads out westward from Baxter Peak,

even though he speaks later of "that spacious table-land on which I was standing" (87), for he was east of Baxter Peak. The tableland, as well as the great basin which opened out northward at his feet, was, as he says, concealed from him by thick clouds. He is precisely where he says, on the summit of the ridge—a ridge higher than most of the tableland if not so high as the peaks.

In this matter, Worthington does not quite do him justice. He places Thoreau's highest point "some place not far from the base of the South Peak", and his sketch map indicates a point on the southwest slope of South Peak. He comments bluntly, "He evidently reached no summit".

Thoreau did not reach the top of either of the two peaks, but there seems to be no reason to question his claim that he reached the summit of a ridge, and the ridge in question can hardly be any but that between Baxter and South Peaks. In any sense except that of the purist who must set foot on the extreme highest point, Thoreau was on top of the mountain.²

ROBERT C. COSBEY

CHAPTERS

Noble View a Tree Farm. Kenneth E. Jones, Forester, New England Forestry Foundation, who for several years has advised the Berkshire Chapter on their forestry practices at Noble View, recommended, after spending a day last spring looking over the Malcolm B. Ross Memorial Forest and the plantings of red pine and Norway spruce which have been made elsewhere at Noble View, that Noble View be qualified as a Tree Farm. The certificate, of July 25, 1960, shows that 315 acres, apparently all the land except that immediately adjacent to the buildings, has been so classified. An accompanying letter from Leon M. Fiske, Jr., Chairman, Massachusetts Tree Farm Committee, says: "Every Massachusetts woodland owner practicing forestry of a quality that earns Tree Farm certification is doing his part as a good citizen to insure adequate supplies of good timber for the future".

CARL O. CHAUNCEY

CONSERVATION

Alaskan Wildlife Ranges. One of the last acts of Fred A. Seaton as Secretary of the Interior was to establish three wildlife ranges in Alaska. The Arctic National Wildlife Range, of nine million acres, lies in the eastern part of the Brooks Range on the northern coast of Alaska, contiguous to Canada. Its wildlife includes grizzly and polar bears, Dall sheep, wolverines and great caribou herds. Huge flocks of migratory waterfowl frequent its countless lakes, ponds and marshes.

² With all due respect for our contributor, and with many thanks for his valuable note, we confess to being purists in the sense mentioned. If, for instance, it were a question of making the first ascent of Katahdin, Thoreau could not claim to have done so. He was not in a position to build the summit cairn, which is the universal evidence of a first completed climb.—Ed.

Mt. Michelson and Mt. Chamberlain rise within its borders to over 9000 feet in altitude. Unique values in wildlife, wilderness and scenery are preserved here. The Kuskokwim National Wildlife Range is located in the Yukon-Kuskokwim River delta in western Alaska. These 1.8 million acres are probably the greatest waterfowl breeding ground on the North American continent and will form the nation's largest wildfowl conservation area. Izembek National Wildlife Range, embracing about 649 square miles on the north side of the Alaskan Peninsula which stretches out to join the Aleutian Islands in the Pacific, is primarily a feeding ground, the most important concentration point for waterfowl in Alaska, where gigantic flights of migrating ducks, geese and shorebirds converge in spring and fall.

Glacier Peak Wilderness Area. In the Northern Cascades of Washington the U.S. Forest Service has designated 458,505 acres as the Glacier Peak Wilderness Area, "dedicated to man's welfare and peace of mind". The final classification includes three valleys (Siuattle River, Agnes and Phelps Creeks) which the regional forester's proposal had designated for use as corridors for access roads, campgrounds, picnic sites, resorts and lumbering; but still left out of the Wilderness are the highly important approach routes of the Whitechuck and White River valleys. This established Wilderness is far less extensive than the Forest Service's original proposal in 1939, and makes no provision for the scenic wilderness lands lying north of Cascade Pass to the North Cascade Primitive Area. Many persons familiar with these mountains believe that the region is of national park caliber and recommend a study by the Park Service, for which permission has been refused by the Forest Service.

Bridger Wilderness Area. After hearings, to which the Appalachian Mountain Club sent a favoring statement, the Bridger Wilderness Area was established by the Department of Agriculture last August. In 1931 this portion of the Bridger National Forest in Wyoming had been set up as the Bridger Primitive Area. Minor boundary adjustments added 290 acres to the reclassified tract. This Wilderness of 383,300 acres is of particular interest to us since it includes the Wind River Mountains. Access to the region, passing through private land, is still in an unsatisfactory state.

In 1960 a record 72,288,000 persons visited the 29 national parks and 147 other areas administered by the National Park Service. Since the visitor-counting system was changed in some parks to achieve accuracy and uniformity, comparison cannot in all cases be made with the figures for 1959. Under the new system all park areas now use the same criteria in determining who shall be listed as a "visitor". Figures taken on the old basis show an increase of 4.8% over the previous year, itself a record. Of the parks, eleven had more than a million visitors, by far the largest number entering the Great Smoky Mountains (4,528,600); Shenandoah ranks second; and the New England Acadia is third in popularity with 1,638,200 visitors.

MARJORIE HURD

Conservation, New York State. In November, 1960, the voters of the State passed the Governor's proposal of a special bond issue of \$75

million to purchase park and recreation lands. The big question is, how is this to be divided among the Forest Preserve, State parks, State forests, and all the counties, towns and municipalities asking for funds.

On December 15, 1960, the Joint Legislative Committee on Natural Resources called a hearing in Albany on the controversial proposal to lease Forest Preserve land on Hunter Mountain in the Catskills to a private corporation to develop ski runs additional to those they have built on adjoining privately owned lands. This had come to first passage at the end of 1960's legislative session and was to be introduced for its required second passage in January, 1961. I attended the hearing, representing the New York-New Jersey Trail Conference and the Rockland County Conservation Association, to speak against the lease. John Coggeshall represented the New York Chapter of the A.M.C., which has opposed the proposal from the start. Altogether 38 speakers, each representing one, two, or even three organizations from all parts of the State, opposed the measure. About 18, most of them local people who hoped that a big ski center would relieve unemployment, favored it.

On January 25, 1961, as a result of the hearing, the Chairman of the legislative committee issued a strong statement in opposition to any lease of the State's Forest Preserve lands. Later, in March, this particular measure was reported out of committee and decisively defeated, but the idea will need careful watching in the future. For it is possible that the many interests which do not believe in wilderness areas are drawing back on this small proposal the better to push some far bigger proposals next year. The Report of the Joint Legislative Committee on Natural Resources for 1960 was issued shortly before the hearing and contains elaborate proposals for cutting up the State Forest Preserve into four snippets of wilderness in the Catskills and eleven in the Adirondacks and opening all the rest, including most lower slopes and watercourses, to "forest management". This means, frankly, lumbering, for which elaborate details are proposed, roads, motor boats on what have heretofore been canoeing and fishing waters, and how many large public campsites and parking areas who can say? Such "conveniences" are attractive to many, but it is a step backward for New York State, which pioneered seventy-five years ago in wilderness preservation.

RUTH GILLETTE HARDY

NOMENCLATURE

Kancamagus Pass. At their meeting of January 12, 1961, the Domestic Names Committee of the U.S. Board on Geographic Names approved the name "Kancamagus Pass" for the pass (elev. about 2860 ft.) in the White Mountain National Forest where the Kancamagus Highway between Conway and Lincoln crosses the saddle between Mts. Kancamagus and Huntington. The Committee expressly state that the name is *not* to be "Kancamagus Notch".

WHITE MOUNTAIN NATIONAL FOREST

Forest-fire Control. With the ending of calendar year 1960, the Forest was credited with a record fire-control year. For the first time in

its 46-year history, the 723,000-acre area could report no fires. The credit for this remarkable record belongs to the many people who used the Forest, to the national forest wardens and cooperators, and to others in the White Mountain area who have helped in keeping wild fire from damaging our valuable resources.

The caches of fire tools designed for aerial dropping have been supplemented this year with special disposable mess outfits, camp outfits, sleeping-bags, hot-food containers and hot-drink containers. The Forest's radio network has been supplemented with a new automatic repeater installed on Cannon Mountain. This instrument, along with the one located on Mt. Washington, now gives satisfactory radio coverage to the entire National Forest area.

Watershed Management. A watershed protection reservoir will be constructed this year on Oliverian Brook in the Town of Benton. The earth dam will be 46 feet high and 1050 feet long and will create a permanent lake of about 28 acres. This project is located on the National Forest and will be constructed under the Watershed Protection and Flood Prevention Act to prevent the annual flood damage along Oliverian Brook in the Towns of Benton and Haverhill. In addition to the dam, the project will involve 3500 feet of stream channel improvement.

Watershed restoration on the Zealand River will continue this summer. This is but one major restoration project planned on this Forest. Work last year consisted of channel clearing and construction of protective walls. Steel-wire mesh baskets, known as gabions, have been used in building some of the walls and structures. Our objectives on this watershed are to reduce the force of flood flows and the movement of bed-load material by the water. These improvements may enhance the possibility of bettering the fish habitat on wild streams of this type. Future plans and projects are anticipated for Mad River, Wild River, and Tunnel Brook.

Timber Management. The management of the National Forests provides for the continuous production of all the renewable resources and for putting together the use of the water, timber, recreation and wildlife resources in a manner that will return the greatest benefits to the public. Most of you are aware that timber is an important resource of the White Mountain National Forest and that the fitting together of the use of this resource with the use of other equally important resources involves a great deal of careful planning on the part of the District Ranger and his staff.

On the White Mountain National Forest, areas of mature timber are selected for cutting according to an approved management plan. The Ranger must weigh the effect of the timber cutting on the other resources and make any adjustments in the logging plans to protect or improve them. After careful study and planning of the proposed timber sale, the area is examined by Foresters to determine which trees should be cut and which ones should be left to grow for another cut in a specified period of time such as ten or twenty years. The volume of each species of tree to be cut is determined and recorded and an appraisal of the value is made based on local markets and logging conditions. All except very small volumes of timber are advertised for sale and sealed

bids are accepted. The timber-sale contract is usually awarded to the highest bidder and an agreement for cutting of the timber is written and signed. The trees to be cut are marked by trained Forest Service crews and the cutting is supervised through regular inspections by the District Ranger. Much attention is given to preserving deer-yard areas and improving food for wildlife; to protecting streams from silting and from logging debris; to protecting roadside and trailside zones for their recreational values; and to the location of logging roads so that they will be available for future logging operations or for other activities such as fire suppression. Each year several miles of roads are built by logging operators on locations surveyed by the Forest Service engineers and left for continued use by hunters, fishermen and other forest users.

The volume of timber sold during the period from July 1, 1959, to June 30, 1960, was 23 million board feet and the volume cut for the same period was 19½ million board feet.

Wildlife Management. As a guide for wildlife management work throughout the Forest, surveys of wildlife habitat conditions have been completed for two areas of about 3,000 acres each. One is the Rob Brook valley in Bartlett and Albany, New Hampshire, and the other is the Patte Brook drainage in Albany, Maine. Wildlife biologists from the State Fish and Game Departments and from the Forest Service made the surveys and wrote management plans that contemplate co-operative work to improve food and cover for game. Softwood stands, known to be used as deer-yards, are being maintained and hardwoods will be cut to promote growth of sprouts that are a favorite food for deer. Alders are cut to encourage woodcock in selected spots; brush areas are developed as grouse cover along roads or in openings; abandoned roads are limed and seeded to produce grass for food and cover; and streams are dammed to create ponds for waterfowl.

In cooperation with the New Hampshire Fish and Game Department, a dam was built this fall at the outlet of Flat Mountain Pond in Waterville. This raised the water-level in the pond about four feet and should improve the water for trout. The road to the pond will be improved within the next two or three years, in conjunction with a timber sale operation further down the brook in the Town of Sandwich. The construction of this dam was one result of surveys of every pond on the Forest that had been made by a biologist of the U.S. Fish and Wildlife Service during the past two years to determine where trout may be expected to prosper and what, if any, steps can be taken to improve the fishing. Similar surveys of streams will begin in the summer of 1961.

Roads and Trails. Considerable progress has been made in repairing the flood damage listed in last year's report. Some repairs were needed on all White Mountain National Forest roads and short sections of the Zealand and Wild River Roads were relocated. The footbridge at Rocky Gorge on the Swift River in Albany was rebuilt, along with the highway bridge on Culhane Brook at Dolly Copp Campground.

The 180-foot suspension footbridge on the Wilderness Trail at Camp 17 in the East Branch of the Pemigewasset valley, was completed on September 1.¹ Work on roads constructed and maintained by the White

¹ See above, under Trails.

Mountain National Forest, other than those previously mentioned, included surfacing of the Bog Dam Road in the Kilkenny Area, drafting of plans for a new bridge across the Swift River on the Bear Notch Road at Passaconaway, and plans for a new campground road at Hastings, Maine. Purchasers of National Forest timber have constructed two miles of road in the vicinity of Shell Pond in Stoneham, Maine, and are in the process of constructing two and a half miles in the Rob Brook drainage in the Town of Albany, New Hampshire. These roads are being constructed to the same standards as all Forest Service roads and, upon completion of the timber sales, they will be maintained as part of the permanent road system of the Forest.

A contract was awarded last year for improving and paving 7.1 miles of the Kancamagus Highway. Improvement work progressed satisfactorily and it is expected that this section will be paved with bituminous material early this year. Plans have been drawn up and contracts will be awarded by summer for improving and paving the section of the highway from the Town of Lincoln to Ledges Brook in the Swift River drainage. It is also expected that contracts will be awarded for paving and improving the 2-mile section east of the Albany covered bridge. In view of the funds available, it appears that contracts for all improvement and paving of the Kancamagus Highway will be awarded by 1962 or early 1963. Plans providing for the construction of additional scenic overlooks and parking areas are being prepared.

Campgrounds, etc. A new 27-unit campground was completed a year ago at the junction of the Mad River and Tripoli Roads in Waterville, to replace the nearby campground destroyed by the flood. The Zealand Campground was repaired and improved and the nearby Sugarloaf Campground was enlarged. Part of the Campton Pond Campground was repaired for use on a temporary basis for family camping until the new area located across the Mad River Road can be completed.

A new wayside area, consisting of the C. L. Graham Wangan Ground and two scenic overlooks with parking lots, was completed last June at the height-of-land on the Kancamagus Highway. The Wangan Ground, which provides tables, parking space, water, and sanitary facilities, was named in honor of C. L. Graham, Forest Supervisor of the White Mountain National Forest from 1937 to 1954. The parking lot at the South Pond Recreation Area was enlarged in the spring of 1960 to help accommodate the increased use. The new 58-unit Campton Campground, which will replace the flood-damaged Campton Pond Area, will be ready for use by this summer. Parts of the old area will be used for group camping and for overflow crowds from the new area. Final plans are being made for a new major recreation area at Russell Pond in Woodstock. The main access road, 2.7 miles in length, is now under construction. Schedules for the construction of this area are not complete but it is expected that initial work will involve the construction of a 80-90 unit campground within the next two-year period. The Lower Falls and Rocky Gorge picnic areas, on the Swift River end of the Kancamagus Highway, will be repaired and improved by this summer.

An interesting and desirable development is taking place on private lands adjacent to the White Mountain National Forest in New Hamp-

shire and Maine in the construction of numerous private campgrounds. These are a welcome adjunct to the sometimes overtaxed facilities of the State and National Forest areas, and the last estimate shows no fewer than 18 of these areas, providing about one thousand additional camping sites for people using the White Mountain region.

Winter Sports. The winter sports facilities located on the White Mountain National Forest have continued to expand during the past year. At the present time, in addition to the Tuckerman Ravine Area, there are all or parts of four other areas on the Forest under special use permits. These include all of the Wildcat Mountain Winter Sports Site and parts of the Waterville Valley, Cannon Mountain and Mittersill Areas. A new 1,000-foot T-bar and a beginners' slope were added to the Wildcat facilities last fall. The Waterville Area constructed a new 1,250-foot T-bar and parts of two new trails, and the Mittersill Area constructed a downhill ski trail on the Forest as an extension of their existing facilities.

The 1960 spring ski season at Tuckerman Ravine was successful and skiing lasted until June 5. The 50-caliber machine gun, loaned to us by the U.S. Army, has proved to be quite successful for use in shooting down the ice that builds up on the headwall in this area. It is necessary to shoot the ice down at intervals of seven to ten days to avoid its dislodging while the area is being used by skiers.

Recreation in General. Recreation visits to the 151 National Forests in the National Forest system totaled 81,521,000 for the year 1959. It is of interest to note that the White Mountain National Forest ranks sixth among all our National Forests in number of visits, with a total of 2,450,000.

The new recreation brochure of the White Mountain National Forest is now available to the public. This is our own publication and there are hopes for release of other factual leaflets on the natural wonders of the Forest this calendar year.

Search and Rescue. New search and rescue plans for the White Mountain National Forest, which coordinate the efforts of all interested and responsible agencies, were developed last year and put into effect.

There was a noticeable drop in the number of search and rescue missions on the Forest last summer, and we are hopeful that additional educational measures, such as the publishing of warning signs for persons unfamiliar with the mountain area, and the very ably conducted Mountain Leadership Clinic of the Appalachian Mountain Club, will continue to reduce these occurrences.

GERALD S. WHEELER, *Supervisor,*
White Mountain National Forest

The 50th anniversary of the passage of the Weeks law, which made possible the establishment of the national forests, will be celebrated in October of this year by the Forest Service and other cooperating agencies such as the A.M.C., the Society for the Protection of New Hampshire Forests, and others. From information supplied by the Forest Service we give the following brief account of the history of the law and its operation.

The Forest Reserve law of 1891 made possible the establishment of Forest Reserves (called National Forests after 1907) from lands in the public domain located mostly west of the Great Plains. Legislation whereby forest reservations could be established did not exist, although the need became apparent early. Interest in the development of public forest reservations in the East was high during three decades preceding the enactment of the Weeks law.

In the early 1880s a Rev. C. D. Smith of Franklin, N. C., is reported to have advocated editorially the establishment of a national park in the Southern Appalachians. Similar proposals were advanced by several other prominent men, chiefly from North Carolina. Dr. Chase P. Ambler of Asheville, N. C., became the principal early advocate of a public reservation in the Appalachians. Senator J. C. Pritchard of North Carolina was the first to initiate action in Congress.

The Appalachian National Park Association (renamed the Appalachian National Forest Reserve Association in 1901) was organized in Asheville in 1899 and became responsible for the first organized effort to secure a public forest reservation in the Appalachian area. A memorial was presented to Congress by Senator Pritchard on January 4, 1900. Supporting resolutions were presented by the Appalachian Mountain Club, the American Forestry Association, and the American Association for the Advancement of Science.

A few years later similar interest developed in New England, chiefly in the White Mountain region, where the Society for the Protection of New Hampshire Forests had been organized in 1901. Phillip Ayres, first forester of this organization, became a militant and persistent advocate of a public forest reservation in the White Mountains. Others in New England who were active in support of this proposal in the early days included Harvey N. Shepard, president of the Appalachian Mountain Club; Frank Rollins, ex-governor of New Hampshire; Curtis Guild, Jr., ex-governor of Massachusetts; and Senator J. H. Gallinger and Representative F. D. Currier of New Hampshire.

Interest in forest reservations also developed in other states, including Arkansas, Missouri, West Virginia, New York and Minnesota; but the Southern Appalachian region around Asheville and the White Mountain region of New Hampshire continued to be the chief centers of interest and action.

Following presentation of the Appalachian National Park Association memorial by Senator Pritchard in 1900 some forty-seven other items were introduced in Congress before the Weeks law was finally enacted. Many measures were presented in the House or in the Senate looking towards establishment of forest reservations in states east of the Great Plains. None of these measures was enacted, although some were reported favorably in either House or by committees of Congress.

Mr. Weeks presented his bill in the House on July 23, 1909, and a similar bill was introduced in the Senate by Senator Gallinger on December 20. The Weeks bill, with some minor amendments, was passed by the House on June 24, 1910, by a vote of 130 to 111. The Senate accepted the bill passed by the House in lieu of the Gallinger bill and passed it on February 15, 1911, by a vote of 57 to 9. It was signed by President Taft on March 1, 1911.

The preamble reads: "An Act to enable any State to cooperate with any other State or States, or with the United States, for the protection of the watersheds of navigable streams, and to appoint a commission for the acquisition of lands for the purpose of conserving the navigability of navigable rivers".¹

The main provisions of the act are as follows. The sum of \$200,000 is appropriated to enable the Secretary of Agriculture to cooperate with any state or group of states in protecting from fire the forested watersheds of navigable streams. The sum of \$1,000,000 is appropriated for the fiscal year 1910, and a sum not to exceed \$2,000,000 for each fiscal year thereafter, for the examination, survey, and acquisition of lands located on the headwaters of navigable streams. A commission (to be known as the National Forest Reservation Commission, and consisting of the Secretaries of War, Interior, and Agriculture, two senators and two members of the House) is designated, to consider and pass upon lands recommended for purchase and to fix the price at which they may be purchased. Examination by the Geological Survey is required, in order to show that control of such lands will promote or protect navigation. The lands acquired "shall be permanently reserved, held, and administered as national forest lands". Civil and criminal jurisdiction over persons on acquired lands shall not be affected. Five percent of the moneys received from national forest lands shall be paid to states, to be expended by the counties in which the lands are located.

An act of June 30, 1914, amended this last provision so as to increase the payments to the counties from five to twenty-five percent of the receipts. The Clarke-McNary act of June 7, 1924, extended the Federal land-purchase policy, allowing the purchase of lands necessary for the production of timber as well as for the protection of navigation.

To date the National Forest Reservation Commission has approved for purchase nearly 19 million acres of land under the Weeks law, and 200,346 acres under other special acts. Land exchanges approved by the Commission have added nearly 600,000 acres to the National Forest system.

In forest-fire cooperation, the number of States cooperating with the Federal Government under the terms of the Weeks law increased from 11 in 1912 to 29 in 1925, when the Clarke-McNary law took over this item. At present 48 States cooperate. Effectiveness of this intensified protection is indicated by "then and now" comparison of fire statistics. In 1916, the earliest year for which acceptable data are available, the average forest fire had an area of 200 acres. In 1959, the most recent statistical year, the corresponding figure was 22 acres.

John Weeks was born in Lancaster, N. H., in 1860 and moved to Massachusetts in 1885. After serving as Representative and Senator, he was appointed Secretary of War by President Harding and continued

¹ It is interesting to observe the very modest terms in which the purpose of this (in fact far-reaching) legislation was originally expressed. Great care is taken not to emphasize the part to be played by the Federal Government; while the express limitation to the watersheds of navigable streams is likewise clearly designed to quiet the opposition of jealous advocates of states' rights, a concern with such streams having always been recognized as proper to the nation as a whole. Nowadays we should be much more ready to accept explicit Federal action, without camouflage, in matters of this sort!—Ed.

in that position by President Coolidge. In this capacity he served as president of the National Forest Reservation Commission from 1921 to 1924. He died in Lancaster, N. H., in 1926.

WHITE MOUNTAIN QUIZ NO. 8

NAMES

(Answers will be found on p. 423)

1. (a) Mention four names—two English, two Indian—which were applied to Mt. Washington, and probably to the whole group of high Presidential peaks, before they received these present names. (b) Was George Washington alive at the time when Mt. Washington was so named, in his honor?

2. What are the present-day names of the mountains and other features formerly called:

- | | | |
|-------------------------------|----------------------------------|--------------------------------------|
| (a) Mt. Calabo, | (b) Great Haystack, | (c) Notch Mountain, |
| (d) Old Shag, or
Toadback, | (e) Pliny Major, | (f) Haystack Lake, |
| | (g) the White
Mountain Notch, | (h) Tamarack Pond,
or Moran Lake? |

3. For each of the following mention another, at present less familiar, name by which it has been or still is sometimes known:

- | | | |
|----------------------------|----------------------|------------------------|
| (a) Mt. Baldpate, | (b) Camel's Rump, or | (c) Mt. Moosilauke, |
| (d) Osseo Peak, | Rump Mountain, | (e) Mt. Silver Spring, |
| (f) West Moat
Mountain, | (g) the Great Gulf, | (h) the Baker River. |

4. In each of the following cases two different names, as listed, have often been, and at times still are, applied to the same mountain or river. Which of the two has been fixed, by the U.S. Board on Geographic Names, as the official name; or, in default of such action, at least accepted by the U.S. Geological Survey for usage upon maps?

- (a) Cannon Mountain, Profile Mountain.
- (b) Camel's Rump, Rump Mountain.
- (c) Mt. Kearsarge North, Mt. Pequawket.
- (d) Sandwich Dome, Sandwich Mountain.
- (e) Mt. Washington River, Dry River.

5. Mention (a) one mountain in the Presidential Range (excluding the Montalban Ridge) which, although bearing the same name as that of a president, was not in fact named for him; (b) one, in the same range, which, although officially bearing the name of a president, is commonly known by another name; (c) two, in the same range, the names of which were interchanged by some authorities during a certain period; (d) three, *not* in the Presidential Range, which have in fact been named for presidents.

6. Of the following mountains and other features, namely:

- | | | |
|----------------------|---------------------|-----------------------|
| (a) Beecher Cascade, | (b) Burt Ravine, | (c) Mt. Carrigain, |
| (d) Champney Falls, | (e) Chandler Ridge, | (f) Edmands Col, |
| (g) Mt. Guyot, | (h) Osgood Ridge, | (i) Tuckerman Ravine, |

one each is named for (1) an artist, (2) an astronomer and trailmaker, (3) a botanist, (4) an editor and publisher, (5) a geographer, (6) a guide, (7) a mapmaker, (8) a preacher, and (9) a victim of fatal exposure. Assign the features to the proper men.

7. Which of the following New England literary men have had mountains or other features named for them? Specify the feature in question. Emerson, Edward Everett Hale, Hawthorne, Longfellow, Lowell, Thoreau, Whittier.

8. Each of the following eminent men has given his name to two different and well separated features. Specify the two, in each case. Louis Agassiz, Thomas Starr King, Charles H. Hitchcock, J. H. Huntington.

9. Mention (a) eight mountains which are named for Indian chiefs (*note*: two of these are subordinate peaks); (b) five named for women (*note*: one of these bears only the woman's surname; in another case the name applies only to the highest peak, not the entire mountain; another is less than 2000 feet high; and still another bears an Indian name); (c) three named for dogs (*note*: two are north or northeast of the Presidentials and one is south of Moosilauke).

10. What were the surnames of the men whose Christian names are preserved in:

(a) Mt. Tom, (b) Mt. Oscar, (c) Ethan Pond?

11. Complete the following names of mountains or parts of mountains by filling in the blanks with single words (common or proper nouns or adjectives):

(a) _____ Arm, (b) _____ Eye, (c) _____ Knee, (d) _____ Nose,
(e) _____ Head (five different cases).

12. For each of the following names point out, by giving rough locations, two different and well separated instances of its occurrence, i.e., two mountains, etc., that are so called:

(a) Mt. Cabot, (b) Cave Mountain, (c) Mt. Doublehead,
(d) Mt. Shaw, (e) Mt. Surprise, (f) Carleton Notch,
(g) Echo Lake, (h) Oliverian Brook.

For each of the following, point out three such instances:

(i) Black Mountain, (j) Owl's Head, (k) Sugarloaf.

13. Distinguish, by giving rough locations: (a) Pleasant Mountain and Mt. Pleasant; (b) Speckled Mountain and Old Speck; (c) Tumbledown Mountain and Tumbledown-Dick Mountain; (d) Table Mountain and Table Rock; (e) Eagle Cliff, Eagle Crag and Eagle Mountain; (f) Pine Mountain, Pine Peak and Pine Hill; (g) the (Lower) Ammonoosuc, Upper Ammonoosuc and Wild Ammonoosuc Rivers. (*Note*: In cases where there are several mountains of the same name, the one intended is that most familiar to climbers, i.e., the one dealt with in the A.M.C. guidebook.)

14. Explain the derivations of the following names:

(a) Cherry Mountain, (b) Mt. Sanguinari, (c) Jobildunk Ravine,
(d) Montalban Ridge, (e) Monticello Lawn, (f) Nineteen-Mile Brook,
(g) Intervale, (h) Marshfield.

15. Select the correct alternatives:

(a) Frankenstein Cliff (Crawford Notch) was named for (1) an engineer engaged in the construction of the railway, (2) a monster in a famous horror story, (3) a landscape painter.

(b) Acteon Ridge (Sandwich Range) was named for (1) a hunter who figures in Greek mythology, (2) an Indian chief, (3) a species of plant.

ROBERT L. M. UNDERHILL

PERSONAL

Emily Klug, a native of Germany and later a trained nurse in Brooklyn, N. Y., started climbing in the White Mountains about 1914-15. She climbed alone and camped out anywhere she happened to find herself at night, along the Gulfside, in Tuckerman or Huntington. With a half sleeping-bag which came up to her waist, and her voluminous cape, she was apparently entirely comfortable. She carried only a small pack but wore a wide skirt of heavy woolen material and breeches underneath of the same cloth. When she started climbing she would lift up her skirt and fasten it firmly around her waist by means of a belt. Inside this circular pocket she stuffed the sleeping-bag and a great deal of other equipment.

This picturesque trampler became a White Mountain legend. A delightful person, whenever she stopped at one of the A.M.C. huts—as she did sometimes for a good meal and rest—she always helped with the dishes, darned the boys' socks and sewed up their shirts. One spring she wrote to Pinkham that she could not get up to the mountains as early as she would like because the elderly patient for whom she was caring at the time "just wouldn't die". Harold Orne reports that she used a very old and almost useless camera "held together with tape and rubber bands". He adds "we received letters and cards from her after she went back to Germany. She never mentioned the war which started soon after. She had great respect for the Club and became a life member after she returned home, even though she could remit only \$5 at a time. It is my opinion that there was never a more ardent lover of the White Mountains than Emily Klug." It has been reported that Emily Klug has died.

LETTERS FROM OUR READERS

I was sorry that Burt, in his *Story of Mount Washington*, made no mention of the ascents of Mt. Washington by that one-legged man, Raymond Welch, who was station master at Northumberland for 18 years. In 1934 he took part in a marathon race of three one-legged men, which Welch won. They started from the Base Station and came up the little trail beside the railroad track. Although the normal time to the summit is about four hours, Welch took only three hours and fifteen minutes. After a few minutes' rest he went down the Carriage Road to the Glen House, a total distance of about $11\frac{1}{2}$ miles. The second, a young man from Brunswick, Maine, reached the summit just as Welch was reaching the Glen House, and had to spend the night on top. The third man, from Plymouth, N. H., after getting partway up, turned around and went back to the Base Station.

The following year, 1935, Welch climbed the mountain through Tuckerman Ravine. He reported that this was much harder. There were places, he told us, where even when he was standing up straight he could touch the ground with his hands. Although the heat was pretty bad, he still found the climb a thrilling experience. (The following week, when he heard rumors that he was all in from the climb, he swam eight miles to prove that he had survived all right!)

He had considerable strength in his arms so that, with a crutch on one side and a cane on the other, he got along pretty well. On the Tuckerman climb he had a helper or two to steady him in the rough places. He was resting in the Tip Top House by the time a group of us from Camp got there about 2 p.m. I have always thought it was a remarkable performance which ought to be noted somewhere.

CHARLES H. LINSOTT

ANSWERS TO WHITE MOUNTAIN QUIZ NO. 8

1. (a) The Christall Hill(s), The White Hill(s), Agio(co)chook, Waumbek Methna. (b) Yes.

2. (a) Mt. Caribou. (b) Mt. Lafayette. (c) Mt. Webster. (d) Mt. Paugus. (e) Mt. Waumbek. (f) Garfield Pond. (g) Crawford Notch. (h) Lonesome Lake.

3. (a) Bear River Whitecap, also Saddleback. (b) Mt. Carmel. (c) Moosehillock. (d) Whaleback Mountain. (e) Bartlett Haystack. (f) Mt. Attitash, or Big Attitash. (g) The Gulf of Mexico. (h) The Asquamchumaukee River.

4. (a) Profile Mountain. (b) Rump Mountain. (c) Mt. Kearsarge North. (d) Sandwich Mountain. (e) Dry River.

5. (a) Mt. Jackson, named for N. H. State Geologist Charles T. Jackson. (b) Mt. Clinton, officially Mt. Pierce. (c) Mts. Adams and Jefferson. (d) Mts. Lincoln, Garfield and Cleveland. (*Not* Hayes or Coolidge.)

6. (a)-(8). (b)-(4). (c)-(7). (d)-(1). (e)-(9). (f)-(2). (g)-(5). (h)-(6). (i)-(3).

7. Mt. Hale, Hawthorne Fall, Thoreau Falls, Mt. Whittier. (Mt. Lowell was *not* named for James Russell.)

8. Mt. Agassiz, Agassiz Basin. King Ravine, Mt. Starr King. Mt. Hitchcock, Hitchcock Flume (on Mt. Willard). Huntington Ravine, Mt. Huntington.

9. (a) Chocorua, Kancamagus, Osceola, Passaconaway, Paugus, Tecumseh, Waternomee, Wonalancet. (b) Mt. Nancy, Mt. Hayes (for Margaret Hayes, landlady of a Gorham hotel), Mt. Martha (summit of Cherry Mountain), Mt. Katherine (1900 ft., in the Sandwich Range), Mt. Weetamoo. (c) Pilot Mountain, Mt. Carlo, Mt. Cube (a corruption of Cuba).

10. (a) Crawford. (b) Barron. (c) Crawford.

11. (a) Mahoosuc Arm. (b) Goose Eye. (c) Jefferson Knee. (d) Nigger Nose. (e) Duck's, Elephant, Indian, Lion, Owl's Head.

12. (a) In the Pilot Range; in Shelburne. (b) At Dixville Notch; near Bartlett. (c) Near Jackson; in the Squam Range. (d) In the Ossipee Range; near Chatham. (e) A shoulder of Mt. Moriah; ditto of Kearsarge

(Continued on page 432)

BOOK REVIEWS

Rakaposhi. By Mike Banks. Foreword by Field Marshal Sir Gerald Templer. New York: A. S. Barnes and Co., 1960. 36 illustrations, 3 maps. \$5.00.

The successful ascent of 25,550-foot Rakaposhi in the Karakoram, after it had defeated six previous expeditions, was a tribute to careful planning and a well-organized team, but even more it was a tribute to Mike Banks. Captain Banks of the Royal Marines had had considerable experience in Greenland before he made his first assault on Rakaposhi in 1956 together with Hamish MacInnes, a rugged Scot, and Dick Irvin and Bob Swift, two determined Americans. That there were no serious injuries on this expedition was extraordinary, for the party was underfed and undermanned and in almost continuous danger from avalanches. The courage of these four men is obvious from Mike Banks' unvarnished account and they deserve the highest praise for their resolve and determination—and perhaps a scolding for pushing their luck so far. The fact is that this small party worked out a route beyond the point reached by George Band in 1954 and proved that Rakaposhi could be climbed. One's heart goes out to them, but big mountains cannot be climbed by nerve and determination alone.

Two years later, as leader of the British-Pakistan Forces Himalayan Expedition (a strong party with full backing from the British Armed Services and the Pakistan Army), Captain Banks returned to Rakaposhi and, with Surgeon-Lieutenant Tom Patey, in bad weather indomitably fought his way from Camp VI to the summit. The summit climb was more like the climbing done by the 1956 party. It was a fight the whole way, with Banks and Patey both frostbitten, and near the verge of exhaustion.

Rakaposhi will interest anyone who likes to read about mountaineering expeditions. It is a forthright, modest account of the climb of a dangerous mountain. Of special interest is the fact that it tells of two very fine but very different expeditions, and proves—alas!—that a big, well-equipped expedition has a better chance of success on such a mountain than an under-equipped small one. But the heart of the reader, and I think of the author too, belongs to the British-American party of 1956. They failed—yes—but as Banks says, "Well, we had a bloody good try". Or as the poet puts it:

Ah, but a man's reach should exceed his grasp,
Or what's a heaven for?

ROBERT H. BATES

Citizen of Two Worlds. By Mohammad Ata-Ullah. New York: Harper & Bros., 1960. xii, 285 pages. \$5.00.

To mountaineers Mohammad Ata-Ullah is familiar as the Pakistani representative on the K2 expeditions of Houston in 1953 and Desio in 1954.

This book is an autobiography describing selected incidents in the life

of a Muslim Punjab native who became a citizen of two worlds through medical education in Lahore and London, a commission in the British Indian Army, extraordinary World War II contacts with Russians, Poles and Americans in Iran, return to the partition of India and Pakistan, and participation in the organization of medical service for Kashmir. The climax of this volume for us is the section dealing with his association with the American and Italian teams in the Karakoram. To them Ata-Ullah proved extremely useful as liaison man with Pakistani officials, Hunza porters and coolies. Although his role during the ascents was chiefly that of communications officer, transmitting weather reports and messages from the lower camps, he identified himself so completely with the 1953 and 1954 expeditions that both Houston and Bates in *K2 the Savage Mountain* and Desio in *Victory over K2* expressed their high regard and affection for him.

This book is mainly about people in some of the regions so well described by William O. Douglas in *West of the Indus*. Ata-Ullah's glimpses of his family life are charming and his reflections are expressions of his wide-ranging mind, seasoned with humor. Those who wish to learn details of Punjabi life would gain more from Zekiye Eglar's recently published *Life in a Punjab Village*. Medical practice in India and Pakistan is better described in Dorothy Clarke Wilson's biography of Dr. Ida Scudder. But to anyone who would like to spend a few hours in the company of a Pakistani whom Lowell Thomas describes in the preface as "one of the most interesting men in Asia", *Citizen of Two Worlds* is recommended. It is good reading.

MARGARET CURRIER

My Wilderness: the Pacific West. By William O. Douglas. New York: Doubleday & Co., 1960. 206 pages, illustrated. \$4.95.

Well titled, Justice Douglas' latest book is a series of sketches of back country scenes of our Northwest that he has visited and loved. Although, but for a lonely beach and a wild river, the locales are all mountain regions, it is in no degree a mountaineering work. In simple prose Justice Douglas makes clear his enjoyment of his physical surroundings and emphasizes the spiritual benefit of such experiences. His sincere belief in the value of wilderness, in man's actual need of it, is a thread running throughout the text: "Man must escape civilization if he is to survive". "An emptiness in life comes with the destruction of wilderness; a fullness of life follows when one becomes on intimate terms with woods and peaks and meadows." There is no adventure here, but an appreciative observation of the sights, sounds and smells of nature—weather, scenery, fauna and especially flora. At times the descriptions seem little more than a catalogue of the trees and flowers encountered, a technique which unfortunately fails to paint a picture for readers less versed in Western botany than the Justice. But the manifest sincerity and hearty appreciation apparent in all the accounts render this a pleasant book to read. The chapter, "Mt. Adams", is to me the most appealing: here are enlightening ecological glimpses, vignettes of gemlike lakes and hidden meadows with their flowers and trees, and thoughts on the value and the loss of wilderness.

The illustrations by Francis Lee Jaques are completely charming. The appropriate drawings on the title-page and at the head of each chapter, and the five full-page scenes, are entrancing. Not only are Mr. Jaques' trees and animals true and artistic, but his rocks and mountains have none of the blanc-mange quality we too often see; they are *hard*.

While the volume has no overtones of personal prowess, either of fishing, hunting or exploration, and is notably concerned with spiritual and esthetic values, it is a completely masculine book. It should do much to popularize the concept of wilderness and bring home to readers that "the residue of wilderness in America has reached a minimum which all who love trails and peaks must now defend".

MARJORIE HURD

Der dritte Pol. Die Achttausender und ihre Trabanten. By G. O. Dyhrenfurth. Munich: Nymphenburger Verlagshandlung, 1960. 263 pages, 32 pages of photos, 16 sketch-maps, 4 route sketches, 6 geological profiles. DM.28.

In 1952 Prof. Dyhrenfurth published a book with a confusingly similar (and, to my way of thinking, equally infelicitous) title, *Zum dritten Pol*, "To the Third Pole", which was a careful history of what had been done up to that time toward climbing the 8000-meter peaks of the Himalaya. The present book describes, primarily, the successful ascents which have now been made of all these 8000ers except one. It is not simply a sequel to the earlier work, since the contents of the latter have here been resumed, though very briefly; nor is it properly a new edition, as the additional material is so considerable. It is rather a fresh and more up-to-date treatment of the same subject-matter, which does not however supersede the earlier volume for the period which the two have in common.

Dividing the Himalaya into nine major districts, from the Kangchenjunga group on the east to the Korakoram on the west, Prof. Dyhrenfurth treats chronologically the climbing history of each. While the chief space is allotted to accounts of ascents of the 8000ers, there are briefer notices of climbs and attempted climbs of lesser peaks. A valuable concluding chapter lists chronologically, with notes, all first ascents of both 8000ers and 7000ers through the first half of 1960. Prof. Dyhrenfurth is a recognized authority on Himalayan mountaineering and one can have all confidence that his treatment is comprehensive and reliable.

My only criticism of the book is that the references to the literature are at times insufficient. The explanation that, due to the present volume of this literature, only the most important items are listed, is inadequate to explain all the omissions. In particular, Prof. Dyhrenfurth's acquaintance with the British and American periodical literature seems to be limited. Furthermore, the innovation of placing all the listings together at the end of the book, instead of on or near the pages where they apply, seems to me the opposite of an improvement. In both these respects I find Marcel Kurz's recent *Chronique Himalayenne* distinctly superior.

An overall comparison between these two books, which cover much

the same ground in much the same way, seems inevitable. (Kurz's book, however, does not at present reach beyond 1955.) Generally speaking, Kurz gives many more details and better catches the flavor of the original accounts; Dyhrenfurth, however, shows a masterly ability to condense the originals into their essentials, giving in relatively small compass a fair picture of the whole. Both books are really indispensable for anyone interested in their subject, and the two together are in a class by themselves, without serious competitors.

ROBERT L. M. UNDERHILL

Snow Avalanches. A Handbook of Forecasting and Control Measures. Forest Service, U.S. Department of Agriculture. Agriculture Handbook No. 194. January 1961. 84 pages, numerous illustrations, charts and diagrams. \$.60.

This book represents a compilation of the results of considerable experience by various forest officers, largely in western ski areas of the United States. One receives the impression that for the most part the book was devised by the snow rangers of Alta, Utah, for very little of the text and other instructive material is devoted to the problems of wet or heavy snow and its associated avalanche types.

There are a few minor errors, such as item d.(4) on page 64, where "inches" should obviously have been "feet". Also the example given with Figure 38 seems to be in error; it should read SS-AA instead of SS-AE. On page 37 one might get the impression that windslabs form on areas where snow has been transported away rather than on areas which benefit from wind deposition of snow.

Basically it is a sound document. The only large complaint which I have is that the book stresses the need for uniformity of terminology (certainly a laudable objective) while referring to practically every type of avalanche as some sort of "slab". The classical nomenclature for avalanche study uses numerous other terms. Many types of slide, other than hard-packed windslabs, will leave from a recognizable line of fracture; they would still be classed as powder or wet-snow slides, rather than all as "windslab".

The text, however, is quite valuable, particularly in the sections devoted to control. Chapters 7-10 are particularly useful and might perhaps be reprinted with great benefit, for more public distribution.

WILLIAM L. PUTNAM

Yankee Loggers, a Recollection of Woodsmen, Cooks and River Drivers. By Stewart H. Holbrook. New York: International Paper Co., 1961. 123 pages, lexicon. Illustrated. Available without charge in response to individual request addressed to International Paper Co., Box 76B, Mt. Vernon 10, New York, N. Y.

After he had been absent for forty years from their payroll the International Paper Company invited Stewart Holbrook, a distinguished alumnus of their Coös County "Phillips Brook Clerk and Scaler College" . . . to "take a long look at the present forest products industry in New England and the Adirondack country, to see how the woods are standing

after some three centuries of letting daylight into the swamp". *Yankee Loggers* possesses the same zesty flavor as Holbrook's famous chronicle of American, and especially Yankee logging, *Holy Old Mackinaw* (1938). It is Holbrook at his best as this country's Number One historian of our logging scene.

The volume with its many illustrations and sketches is reproduced in offset lithography. This makes for easy reading and appreciation. George Loh's art work is outstanding—truly lifelike.

The real message in this volume is the necessity for conservative sustained-yield practices, a lesson which the forest industry of the Northeast had to learn by costly experience. But learned it has, that "the same economic pressures that taught [the Scandinavian countries] good forestry are beginning to work on us".

C. FRANCIS BELCHER

Look to the Wilderness. By W. Douglas Burden. Boston and Toronto: Little, Brown and Co., 1960. 245 pages, 19 photographs. \$6.50.

As Mr. Burden states in his foreword, each story "seeks to capture the feeling of some particular wild place and to suggest the happiness I knew there and the deep peace and fulfilment that wilderness adventures can give".

The book recounts a series of unique experiences from an early boyhood trip alone with an Indian guide in the Canadian North through grueling trips as a seasoned hunter and adventurer in such remote areas of the world as the Himalaya, Mongolia and Komodo.

The quotations at the beginning of each chapter from *This is the American Earth*, by Ansel Adams and Nancy Newhall, are reminders that the author means to make a plea for wilderness preservation, but the more placid reader may recoil at times from the expressions of joy in the fresh kill.

Those who like big-game hunting with an accent on primitive wilderness adventure and a struggle with the elements will find this book good reading.

BARBARA DuBOIS

Journey Into Summer. By Edwin Way Teale. New York: Dodd, Mead & Co., 1960. 366 pages, 53 photographs by the author. \$5.95.

This book might be described as the record of a 19,000-mile journey by car and on foot, starting near Franconia Notch on the first day of summer and ending on its last day on the summit of Pike's Peak. But it is not a travelogue. Neither can it serve as a guidebook, except to those who care more for the unknown beauties of forest, mountain, river and prairie off the highway than for the wonders readily accessible and adequately catalogued for all.

Teale has used the theme of his long, leisurely journey to create a unique portrait of the natural history of summer throughout our country. This is not a book to be read hastily. It contains masses of surprising information and impressions that could have been condensed into one readable and engaging book only by an author who has the knowledge and enthusiasm of Edwin Way Teale.

Journey Into Summer is the equal of his other two seasonal books, *North With the Spring* and *Autumn Across America*.

D. P. SEVERANCE

Climber's Guide to the Cascade and Olympic Mountains of Washington. By a Committee of the Cascade Section of the American Alpine Club under the Chairmanship of George R. Sainsbury. [New York]: American Alpine Club, 1961. xii, 386 pages, index, 8 halftones, numerous sketches, maps. \$5.00.

This is a revision of the original edition by Fred Beckey first published in 1949 by the American Alpine Club. The accelerated climbing activity in the last ten years, which necessitated this revision, is readily shown by the fifty percent increase in the number of peaks covered and the number of pages required. Many of the inaccuracies and omissions of the earlier edition have been rectified but there are still omissions in the lesser traveled portions of the range. This book is a great improvement, as would be expected of a second effort, and is a necessary tool for anyone planning climbs in Washington as well as an invaluable work of reference.

K. A. HENDERSON

A Climber's Guide to Glacier National Park. By J. Gordon Edwards. San Francisco: Sierra Club, 1960. 141 pages, 55 photographs. \$3.75.

A very attractive little book which fits into a pack easily. It resembles Ortenburger's *Climber's Guide to the Teton Range* by the same publisher. It is definitely a book for the climber, not the walker, and presupposes knowledge of climbing techniques. Most peaks are classified as Class 3 climbs, of which the Class 3 stretches are generally near the summit and of short duration. The route descriptions are clear, but one must realize that these are not worn or marked trails of the type found in the East.

There are maps of each region, sketches of routes of ascent and summit panoramas. The photographs are masterly and most excellently reproduced. Also, short chapters on plants, rock formations, and the climbing history of Glacier Park add to the value of the book, as well as a foreword by David Brower on mountain safety.

In criticism it may be said that the pictures and the text have little connection, that the maps lack a scale, and that a short description of each region and the trails in it might help a newcomer get his bearings. Dr. G. C. Ruhle's *Guide to Glacier National Park* (Campbell-Mithun, Inc., Minneapolis, 1954), as well as a U.S.G.S. topographic map should be carried in addition to this book by anyone not already familiar with the area.

KLAUS GOETZE

Guide To The Appalachian Trail In Central And Southwestern Virginia. Fifth Edition. Published by Potomac Appalachian Trail Club, 1916 Sunderland Place, N.W., Washington 6, D. C., 1960. 278 pages, index, no maps. \$2.00.

This guide, the last of three which replace the 1,000-page fourth edition (1950) of *Guide To Paths In The Blue Ridge* (other two reviewed in APPALACHIA, December 1959 and December 1960), covers some 310 miles of the AT, of which a 160-mile stretch has been completely re-routed since 1950 far to the west of its original course.

Scrupulously detailed data for each Trail section, in each direction, are preceded by a more readable comment on the general area and on the history of that part of the Trail. Like its two companions, this guide is of convenient pocket-size dimensions, with a flexible washable cover and easily removable pages. Unlike them, its cover is cheerfully red and its pages are not dated.

The guide refers to P.A.T.C. Maps 12, 13, 14 and 15. These are to be sold separately and are expected to be ready this spring.

The network of abandoned roads, paths, and other trails in this area make the detailed trail data a necessity; besides, this guide makes entertaining reading. Persons desiring to cover only those sections of the AT where they may sleep under a roof every night, however, should communicate with the appropriate National Forest Supervisor, as it will not be feasible for revised pages of this guide to keep pace with the Forest Service's construction of shelters along this portion of the AT (note, e.g., Maupin Field Shelter, described in the January 1961 *Appalachian Trailway News*, p. 3).

In summary, the guide is interesting reading, and it is a must for those who may walk the AT anywhere between Rockfish Gap and the Virginia-Tennessee line.

WALLACE HAYNES WALKER

Canoeing White Water in Northern Virginia and Northeastern West Virginia. By Randy Carter. Warrenton, Virginia: published by the author, 1960. 91 pages, one map, illustrated with line drawings. Paperbound, looseleaf, spirit duplication. \$2.

White-Water Boating in Pennsylvania, Maryland, Virginia and West Virginia. By Walter F. Burmeister. Philadelphia, Penna.: Buck Ridge Ski Club, 1956. 93 pages, one map. Paperbound, looseleaf, mimeographed. \$1.

These two guides to white-water rivers are so similar in many ways that comparison of them is inevitable. Both authors are obviously aware of the likelihood of necessary revisions, hence the formats used; they nonetheless feel that the rapid growth of the sport makes it imperative that as much authoritative information as possible be made available quickly to the "down-river yachtsman". Both are at their best in the actual descriptions of the rivers and the problems to be met; they are specific and detailed in their instructions. Both value highly the wilderness beauty of the areas through which many of the rivers flow. While the book titles correctly indicate some overlapping in the streams described, this is not a serious deterrent to owning both, since accounts of only five streams appear to be duplicated. Carter gives much more space in his handbook to the Potomac and the Shenandoah than does Burmeister; the Cacapon, the Lost and the Cheat Rivers fare about equally in both books. While Burmeister's book is oriented toward the

foldboatist and Carter's toward the canoeist, the material in both books would be helpful to either category of white-water enthusiast, and Carter has explained in his text how to adjust for foldboat use the data he gives.

In a comparison of these two handbooks, it is quickly apparent that Burmeister's is, as the title page indicates, "Excerpts from the unpublished manuscript, White Water Boating". The material is well organized, extraneous text has been deleted, typographical errors and misspellings are nonexistent. It is mimeographed on standard 8½ x 11 stock. Carter, on the other hand, should perhaps have considered this effort a first draft. He is plagued by numerous mechanical problems: there are many hand corrections, the map and several of the illustrations are crude and confusing, the spirit duplication is uneven. Much interesting and worthwhile material on canoeing technique, historical background and interpretation of data is spread throughout the text, seemingly as page-filler; there is no index to help the reader locate it. Mr. Carter seems to have undertaken too large a task in the present edition; it lacks much in organization and reproduction. However, its size, about that of APPALACHIA, makes it quite convenient to use. It is to be hoped that a second edition will eliminate these shortcomings and make available to the white-water canoeist another efficient guidebook to what is obviously a collection of challenging and attractive rivers.

ROBERT N. BLISS

Canoe Trails Through Quetico. By Keith Denis. Drawings by Selwyn Dewdney. Toronto, Canada: Quetico Foundation, 1959. Distributed by University of Toronto Press. 84 pages, 21 drawings, 1 photograph, 1 map. \$3.50.

This 6 x 9-inch paperback canoeing guide describes fifteen routes through Quetico Park of Ontario, Canada, and adjacent provincial waters. The author, a native of this region, has done an excellent job of describing distances, locations of falls, rapids and campsites, as well as making lively notes on the fishing and the flora and fauna of the area. He has interspersed this commentary with amusing vignettes and sketches of the life and times of the voyageur and the present-day recreational canoe-traveler to the Park. The appended bibliography provides useful historical references to this noted region. To my knowledge, this is the first guidebook of its scope for Quetico Park.

The notes on choice of an outfit and the suggested grub list will be more useful to new converts than to experienced hands at canoe-camping. Comments on safety and wilderness manners are appropriate.

The paper map, with the canoe routes superimposed, is on a scale of two miles to the inch. Unfortunately, it does not have contour lines and its other data are sketchy. Maps by the U.S. Corps of Engineers of the contiguous Superior National Forest canoe area in Minnesota are better drawn and recommended additions.

For those canoeists who enjoy retracing the highways of the early fur traders and their hardy voyageurs, this guide will have particular appeal and usefulness.

JOHN L. MALAGUERRA

BRIEFLY NOTED

Havasu Canyon, Gem of the Grand Canyon. By Joseph Wampler, Harold C. Bryant and Weldon F. Heald. Berkeley, Calif.: published by Joseph Wampler (Box 45, Berkeley 1), 1959. 121 pages, many photos, map. \$2.00.

Gives much interesting and useful information about this beautiful region and its inhabitants, the Havasupai Indians. Practical advice on how to arrange a visit, and a valuable bibliography of considerable extent.

High Sierra Mountain Wonderland. By Joseph Wampler and Weldon F. Heald. Berkeley, Calif.: published by Joseph Wampler (Box 45, Berkeley 1), 1960. 122 pages, many photos, 3 sketch-maps. \$2.00.

Describes the heart of the Sierra Nevada, with particular reference to the John Muir Trail. Included are discussions of the geology, fauna and flora of the region. Practical advice on how to plan a trip, and an extensive bibliography.

(Continued from page 423)

North. (f) In the Crescent Range; in the Carter-Moriah Range. (g) In Franconia Notch; beneath White Horse Ledge. (h) In the Sandwich Range; north and northwest of Glenclyff, through Oliverian Notch. (i) North of Jackson; northeast of Milan; in the Sandwich Range. (j) On Cherry Mountain; on an unnamed mountain east of Mt. Lincoln; in the Benton Range. (k) North of Mt. Hale (a pair); in Stratford, south-east of Nash Bog Pond; in the Benton Range.

13. (a) Near Fryeburg, Me.; in the Presidential Range. (b) Southeast of Evans Notch; in the Mahoosuc Range. (c) Northwest of Weld, Me.; northeast of Gilead, Me. (d) North of the Swift River, between Bear and Moat Mountains; in Dixville Notch. (e) In Franconia Notch; north of North Baldface; northwest of Jackson. (f) Northeast of Mt. Madison; northwest of Mt. Jefferson, in the Dartmouth Range; east of North Chatham. (g) From the Lakes of the Clouds west to the Connecticut at Woodsville; from the Pond of Safety east, north and west to the Connecticut at Groveton; from Kinsman Notch northwest to the Lower Ammonoosuc near Bath.

14. (a) A corruption of the French "Pondicherry". (b) From its red color at sunset. (c) Traditionally (but perhaps incorrectly) from the combined names of three boys—Joe, Bill and Duncan. (d) From the Latin for "White Mountain". (e) From the name of Thomas Jefferson's estate in Virginia. (f) Because it crosses the Pinkham Notch Road 19 miles from the Town of Conway boundary line. (g) A corruption of "Interval", from the Latin *inter vallum*, meaning an area "between ramparts". (h) A combination of the surnames of Sylvester Marsh, promoter of the Cog Railway, and Darby Field, first to ascend Mt. Washington.

15. (a)-(3). (b)-(2).

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MURRAY D. SPEAR, Director

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Gasherbrum 1 (Hidden Peak), illustrated above, was climbed by the 1958 American Himalayan Expedition which selected BAUER clothing & sleeping bags.

100%

Down
INSULATED

WEIGHS ONLY
3 LBS. 5 OZS.

BAUER Snow Line MUMMY BAG

Ultra-Light Sleeping Bag for Summer Backpacking.

COMFORT RANGE: 25° to 60° Above Zero. Opens wide at top for easy access and can be left open for ventilation in warm weather. Hood closes with drawstring for head and shoulder protection in severe weather. Fully insulated with 100% premium quality Northern goose Down. Outer fabric is durable, lightweight glacier green Rip-Stop nylon, lining is silver sand Rip-Stop nylon.

No. 405—STANDARD SIZE\$39.95*
Net weight 3 lbs. 5 ozs.

No. 405L—LONG SIZE\$44.95*
Net weight 3 lbs. 10 ozs.

For persons over 6 feet tall.

*Add \$1.00 for shipping.

100%

Down
INSULATED

"V" TYP
LAMINATED

BAUER Kara Koram MUMMY BAG

Warmer Per Unit of Weight Than Any Others.

Choice of mountaineers and those finding warm and compactness most important. Outer fabric proof, water repellent forest green Element cloth is glacier green Rip-Stop nylon.

COMFORT RANGE No. 400—Standard Size
(Zero to 65° Above) Net weight 5 lbs. 10 ozs.
No. 400L—Long size...
Net weight 6 lbs.

COMFORT RANGE No. 401—Standard Size
(20° Below to Net weight 6 lbs. 2 ozs.
60° Above) No. 401L—Long Size...
Net weight 6 lbs. 8 ozs.

*Add \$1.50 for shipping

LONG SIZE for persons over 6 feet tall

Some of the expeditions which have chosen
Eddie BAUER® Down garments and
sleeping bags include:

- 1958 American Himalayan Expedition
- 1958 Slick-Johnson Abominable Snowman Expedition
- 1957-58 Geophysical Year Expeditions to both the Arctic and Antarctic
Construction workers and operators of the DEW Military Defense Line in the Far North
- 1955 International Himalayan Expedition
- 1954 California Himalayan Expedition
- 1953 American K2 Himalayan Expedition

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